



USACHPPM

**GUIDANCE FOR CONFORMING TO THE  
REQUIREMENTS OF THE  
LONG TERM 2 ENHANCED SURFACE  
WATER TREATMENT RULE**

**Water Supply Management  
Information Paper № IP-31-042**

USAEC



## EXECUTIVE SUMMARY

**1. PURPOSE.** This information paper provides an overview of the recently promulgated Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). The intent of this rule is to reduce the risk of microbial disease by implementing additional treatment targeting *Cryptosporidium* in those public water systems shown to be at greater risk.

## **2. IMPACT ON ARMY WATER SYSTEMS.**

### **a. Affected Army Public Water Systems.**

(1) The process of disinfection has unquestionably reduced the number and extent of waterborne illness during the last 50 years. However, while disinfectants are effective in controlling many microorganisms, health information has indicated that disinfectants and their resulting disinfection byproducts may impact human health. Because of these risks, the LT2ESWTR and Stage 2 Disinfectants and Disinfection Byproducts Rule were promulgated simultaneously to address risk trade-offs between the control of pathogens and limiting exposure to disinfection byproducts.

(2) The LT2ESWTR is a complex rule that applies to all public water systems (PWSs) supplied by a surface water or groundwater under the direct influence of surface water (GWUDI). This includes community and non-community PWSs of all sizes. Army consecutive PWSs will not be required to comply with the LT2ESWTR, provided they are in compliance with the requirement to cover any uncovered reservoirs and their wholesale supplier is fully compliant with the applicable LT2ESWTR requirements. However, some State agencies may have additional requirements beyond those in the National Primary Drinking Water Regulations. PWSs should have received notification of monitoring requirements and schedule no later than February 2006 for PWSs serving  $\geq 50,000$  and July 2006 for PWSs serving  $< 50,000$ . Table 9 on page 24 lists the Army PWSs that may be affected by the LT2ESWTR; approximately 22 Army PWSs may be affected. The earliest compliance date for Army PWSs is January 2007, in which PWSs serving 50,000 – 99,999 people must submit their *Cryptosporidium* sample schedule. Any Army PWSs using a surface water or GWUDI source will have to complete initial and second round monitoring, and possibly implement further treatment requirements. To properly implement the LT2ESWTR Army PWSs must work closely with the State agency. The U.S. Environmental Protection Agency (EPA) has granted State agencies a great deal of

flexibility in implementing this rule; therefore, Army PWSs would benefit from creating a partnership with the State agency. Installations outside of the United States will have to comply as LT2ESWTR requirements are incorporated into the Overseas Environmental Baseline Guidance Document.

b. LT2ESWTR Provisions.

(1) Army PWSs using surface water or GWUDI will have to conduct monitoring (either *E. coli* or *Cryptosporidium*), or take steps to grandfather data already accrued. The rule requires PWSs to conduct initial monitoring to determine the occurrence of *Cryptosporidium*. Based on these results, filtered PWSs will be placed in one of four bins, or treatment categories. If placed in Bin 2 – 4, the filtered PWS must comply with additional treatment requirements. Unfiltered PWSs must provide a level of inactivation based on the arithmetic mean of initial monitoring. A second round of monitoring is required 6 years after the initial monitoring to ensure there were no substantial changes to source water quality. If a system significantly changes their disinfection processes, they must conduct disinfection profiling and benchmarking. The LT2ESWTR also requires PWSs with any uncovered finished reservoirs to either cover the facility or treat its discharge.

(2) Source water monitoring requirements do not apply to purchased PWSs if the water received from the wholesale system has been monitored and treated. However, they must comply with the uncovered finished water storage reservoir requirement. PWSs in a combined distribution system (that are not part of a wholesale system) are required to monitor based on their own population served; they are not affected by the size of their suppliers. State agencies have already defined these interconnected wholesale and consecutive system relationships.

**3. ACTIONS FOR ARMY WATER SYSTEMS.**

a. Resource Planning.

(1) Plan for associated LT2ESWTR-associated costs well ahead of any significant requirements, such as monitoring costs or additional treatment requirements. Arrange contracts with both a primary and backup laboratory. *Cryptosporidium* tests cost approximately \$500 per sample; therefore, the minimum required monitoring with two matrix spikes is approximately \$13,000. Depending on sample collection method, overnight shipping charges for 10 L of water (at least) would apply for each sample (roughly \$100 per 10 L sample). Additional resources:

- Figure, Compliance Timeline
- Compliance Flowcharts following the Executive Summary (and Appendix C)
- Appendix D, Laboratories Approved for Analysis of *Cryptosporidium* Under the Safe Drinking Water Act (SDWA)

- Appendix E, LT2ESWTR – Method 1622/1623 FAQ
- EPA Source Water Monitoring Guidance Manual for Public Water Systems ([http://www.epa.gov/ogwdw/disinfection/lt2/pdfs/guide\\_lt2\\_swmonitoringguidance.pdf](http://www.epa.gov/ogwdw/disinfection/lt2/pdfs/guide_lt2_swmonitoringguidance.pdf))
- U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Laboratories, (410) 436-2208, <http://usachppm.apgea.army.mil/dls/>

(2) Consider sampling early and grandfathering the data. At the time this document was published, there were 39 EPA-approved laboratories capable of conducting *Cryptosporidium* testing. Fourteen of those laboratories (primarily city or State laboratories) are not accepting “outside” samples. There are approximately 1,700 PWSs that will be conducting *Cryptosporidium* monitoring. Although monitoring dates for these PWSs will be staggered based on system size, there will be some overlap. Additional resources:

- Appendix D, Laboratories Approved for Analysis of *Cryptosporidium* Under the SDWA
- EPA Source Water Monitoring Manual ([http://www.epa.gov/safewater/disinfection/lt2/pdfs/guide\\_lt2\\_swmonitoringguidance.pdf](http://www.epa.gov/safewater/disinfection/lt2/pdfs/guide_lt2_swmonitoringguidance.pdf))
- USACHPPM Laboratories, (410) 436-2208, <http://usachppm.apgea.army.mil/dls/>
- Compliance Flowcharts following the Executive Summary (and Appendix C)

b. Preparing for the LT2ESWTR.

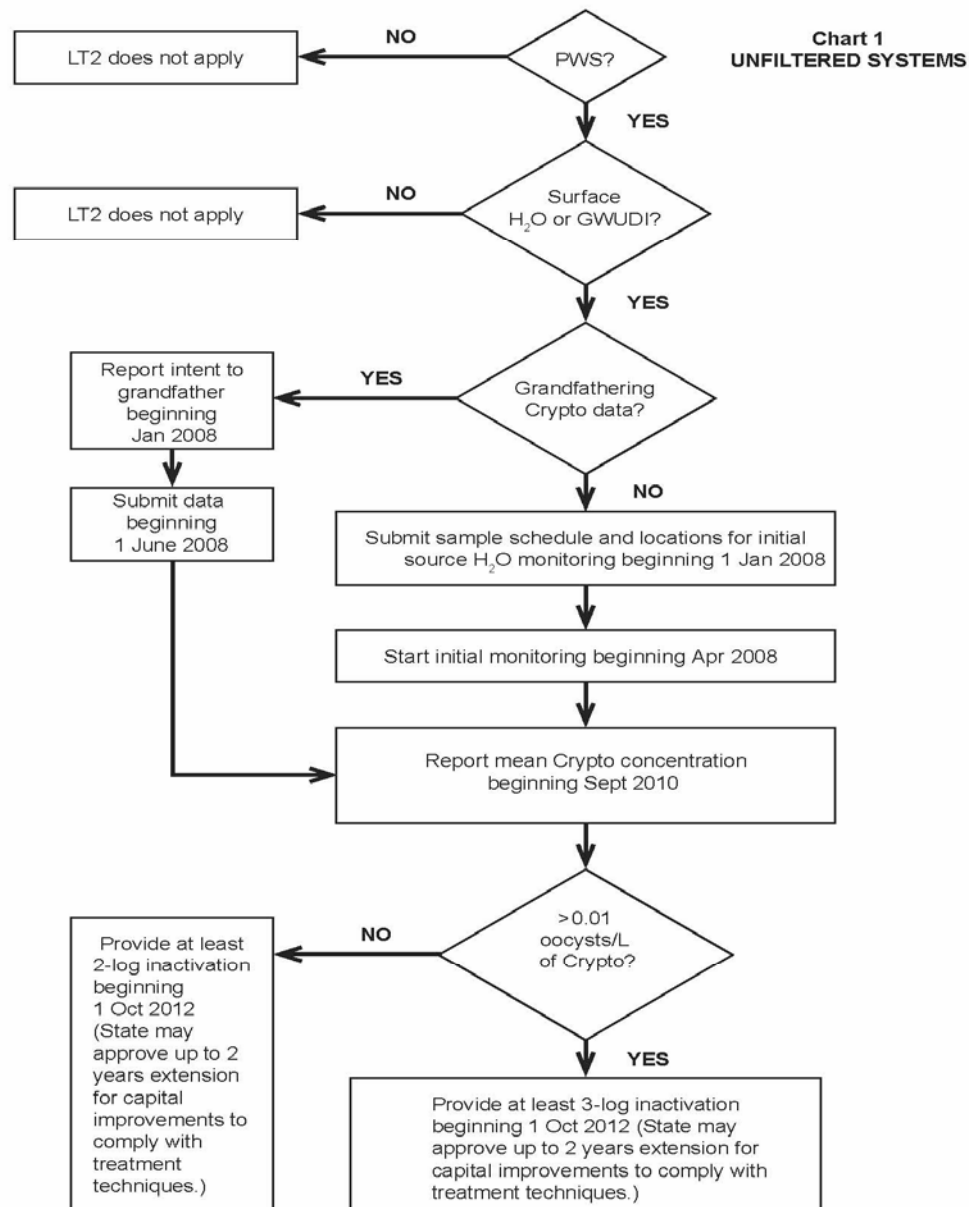
(1) PWSs should work closely with the State agency to ensure complete compliance. Army installations affected by Base Realignment and Closure, in particular, need to coordinate with the State agency on how the LT2ESWTR will affect their water system. Army PWSs must determine how the LT2ESWTR will apply and account for all PWSs on the installation. Verify the information gathered by installation matches that sent by the State agency or EPA. Contact the State agency for assistance for questions regarding determination of which PWSs must comply with the LT2ESWTR. Additional resources:

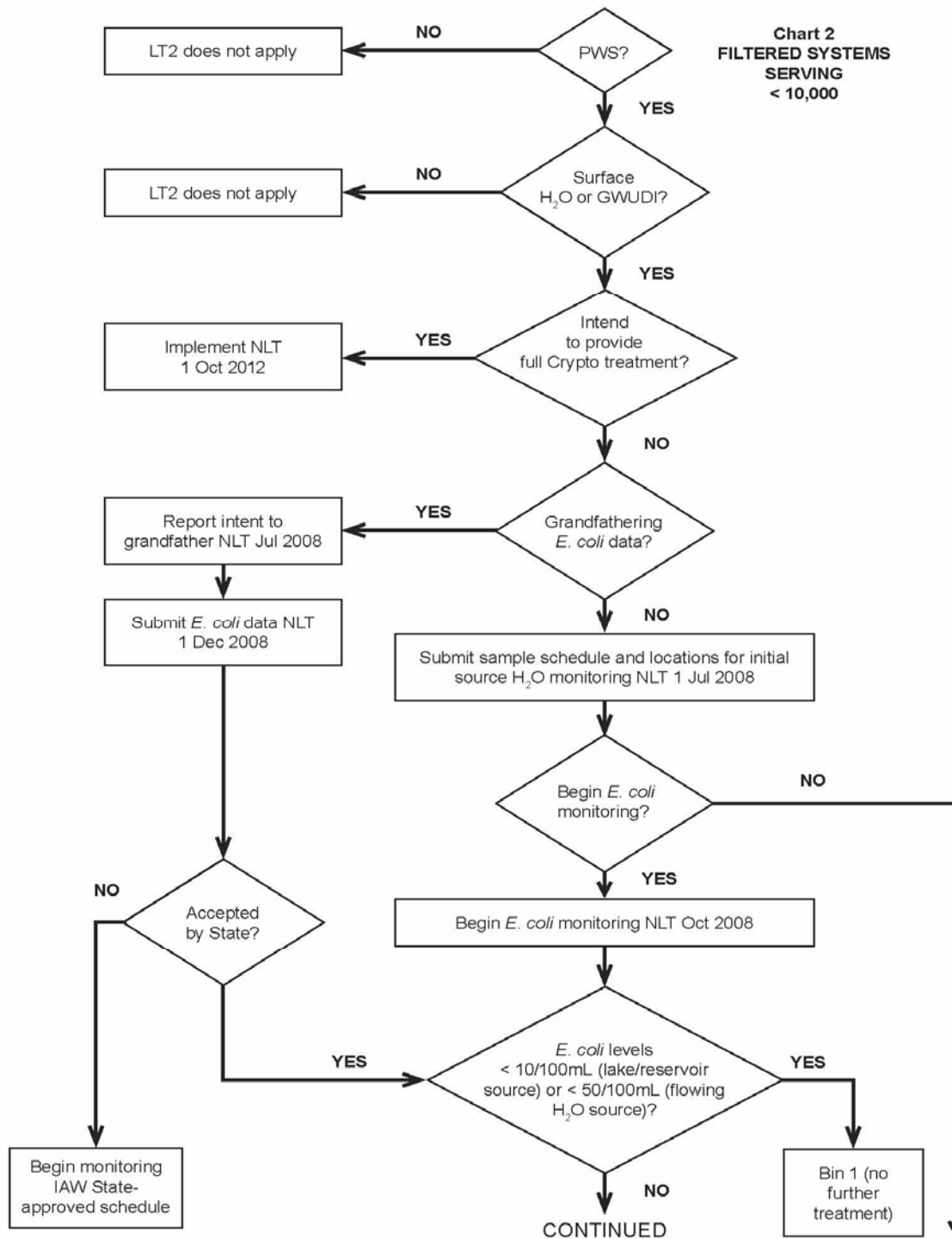
- Appendix G, EPA and State Agency Points of Contact
- [Stage2mdbp@epa.gov](mailto:Stage2mdbp@epa.gov) – email LT2ESWTR Implementation Team
- Compliance Flowcharts following the Executive Summary (and Appendix C)

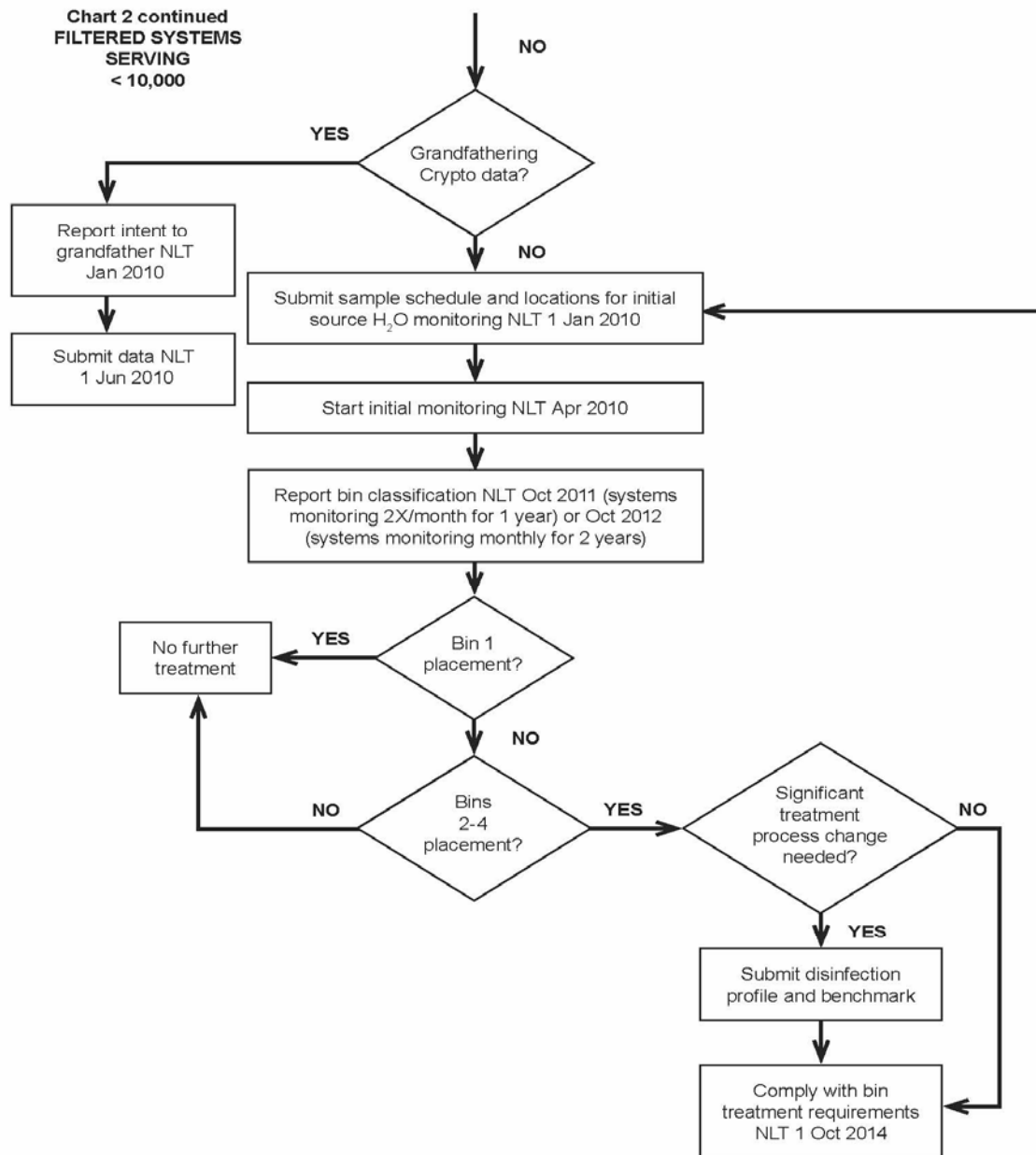
(2) Seasonal recreational areas or ranges with a surface water/GWUDI source may be classified as a non-transient or transient non-community PWS. If such a system has a separate source from the main installation water treatment plant, monitoring will likely also be required for additional PWSs. Verify the information gathered by the installation matches that sent by the EPA or State agency. Contact the State agency for assistance for questions regarding determination of which PWSs must comply with the LT2ESWTR. Additional resources:

- Appendix G, EPA and State Agency Points of Contact
- [Stage2mdbp@epa.gov](mailto:Stage2mdbp@epa.gov) – email LT2ESWTR Implementation Team

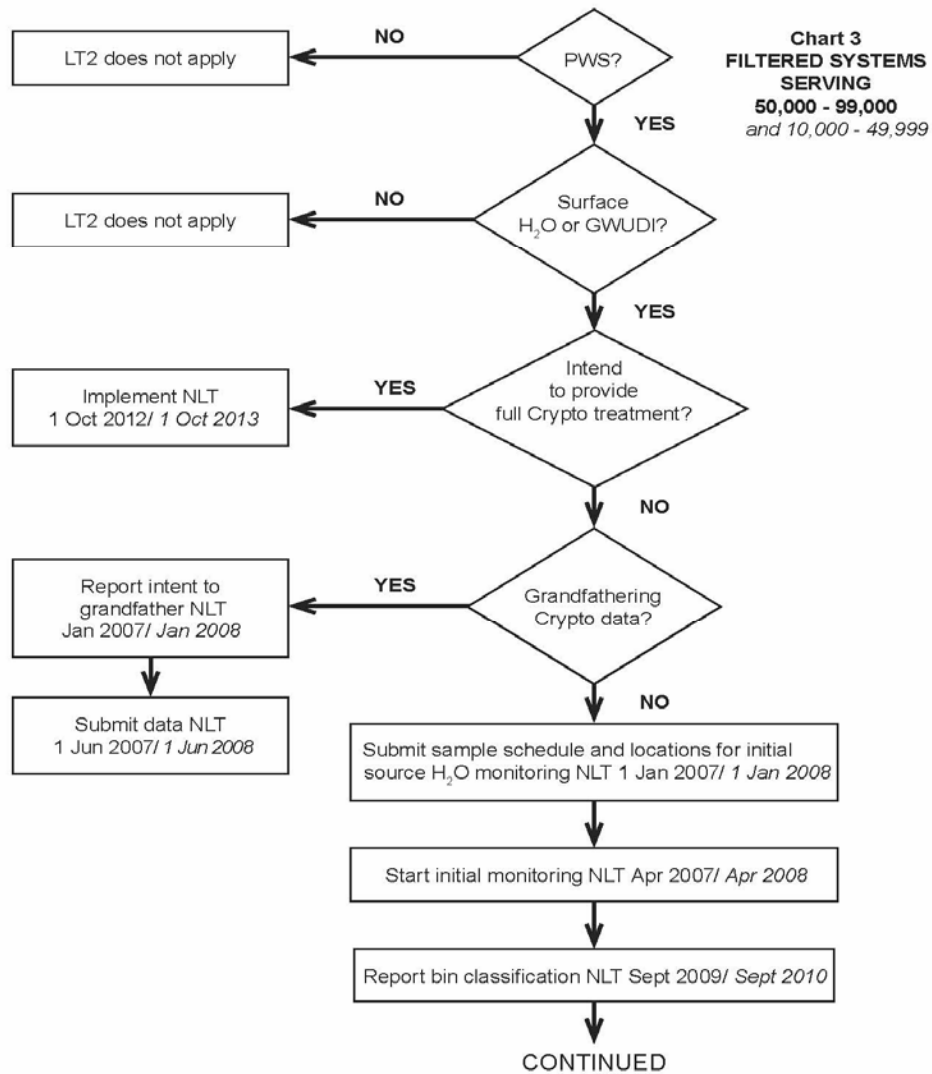
(3) Technical assistance may be obtained from sources such as the USACHPPM, Water Supply Management Program at (410) 436-3919 or DSN 584-3919. Assistance may also be obtained from the U.S. Army Environmental Center (USAEC), Environmental Compliance Division at (410) 436-7068 or DSN 584-7068.

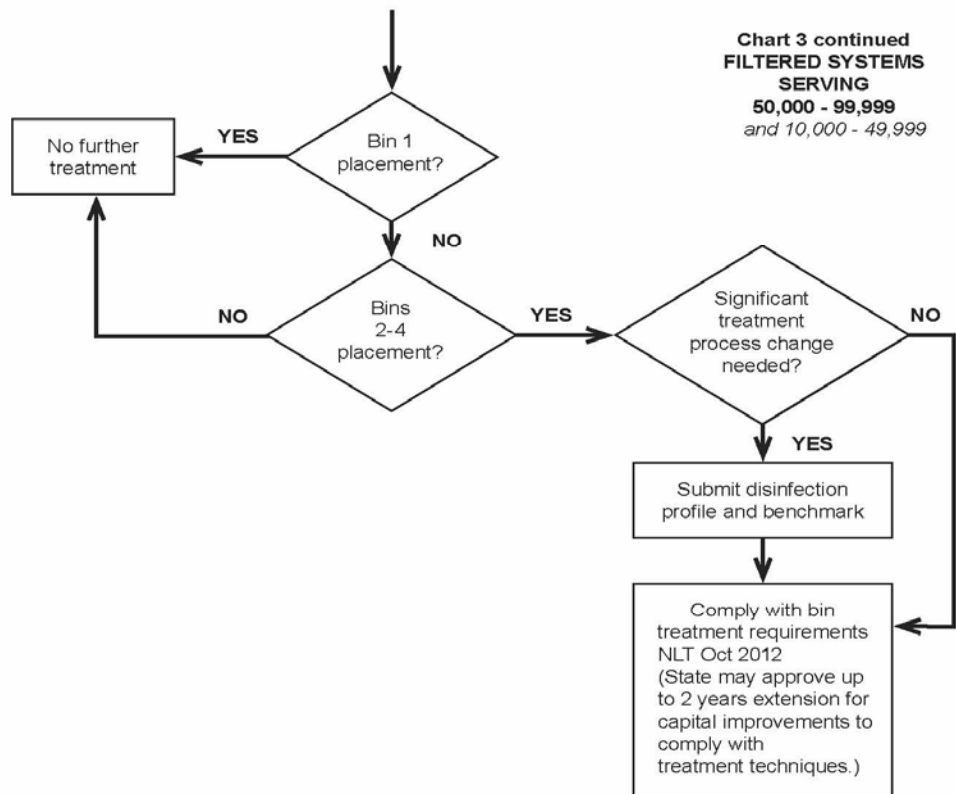












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**WATER SUPPLY MANAGEMENT  
INFORMATION PAPER NO. IP-31-042  
GUIDANCE FOR CONFORMING TO THE REQUIREMENTS OF THE  
LONG TERM 2 ENHANCED SURFACE WATER TREATMENT RULE**

**1. REFERENCES.** Appendix A contains a complete list of references.

**2. PURPOSE.** This information paper provides an overview of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). This paper also identifies provisions of the rule that will affect Army installations and actions these systems can take to remain in compliance and improve drinking water quality.

**3. DEFINITIONS AND ABBREVIATIONS.** The LT2ESWTR contains numerous terms that may be unfamiliar or are unique to the new rules. Definitions and abbreviations are provided in Appendix B.

**4. REGULATORY BACKGROUND.**

a. Safe Drinking Water Act (SDWA). Congress passed the 1974 SDWA in an effort to ensure improved drinking water supplies in the United States (U.S.). The nation's drinking water supplies are regulated with respect to contaminants impacting health by the National Primary Drinking Water Regulations (NPDWRs) (reference 1). Amendments were passed in 1996 requiring the U.S. Environmental Protection Agency (EPA) to further regulate certain microbial contaminants and disinfection byproducts (DBPs) (reference 2). Such regulations create a regulatory balance between protecting consumers from the threats of certain microbial pathogens while minimizing the health risks from the byproducts formed by the disinfectants used to control those pathogens. These regulations came to be known as the Microbial and Disinfection Byproduct Rule.

b. Drinking Water and Health Concerns.

(1) The vast majority of Americans drink tap water that meets all existing health standards. The EPA's Science Advisory Board concluded in 1990 that exposure to microbial contaminants such as bacteria, viruses, and protozoan (e.g., *Giardia lamblia* and *Cryptosporidium*) was likely "the greatest remaining health risk management challenge for drinking water suppliers" (reference 3). Acute health effects from exposure to microbial pathogens are documented and the associated illness can range from mild to moderate cases lasting only a few days.



(2) The process of disinfection, in particular chlorination, has unquestionably reduced the number and extent of waterborne illness during the last 50 years. However, while disinfectants are effective in controlling many microorganisms, health information obtained during the last 2 decades has indicated that disinfectants and their resulting DBPs may themselves impact human health. Disinfectants have been found to react with natural organic and inorganic matter in source water and distribution systems to form these DBPs. More than 200 million people in the U.S. consume water that has been disinfected. Because of the large population exposed, health risks associated with DBPs, even if small, need to be taken seriously.

(3) An additional challenge to providing protection from microbial pathogens is that a number of them, such as *Cryptosporidium*, have proven resistant to traditional disinfection practices. *Cryptosporidium* is a microorganism classified as a protozoan that is carried in the gut of numerous animal species and exists in the environment in a protective shell known as an oocyst. The organism is excreted in fecal material and can be found in nearly all surface water supplies (reference 4). When ingested by humans, *Cryptosporidium* can cause a severe diarrheal illness (particularly in the immunocompromised), known as cryptosporidiosis. Unfortunately, disinfection of *Cryptosporidium* using chlorine has proven to be “completely ineffective” (reference 5). Physical removal via filtration has been considered the most important means of controlling *Cryptosporidium*. However, since the *Cryptosporidium* oocysts are only 4 - 5 microns, filtration is not a fool-proof means of controlling the pathogen. Therefore, it is critical that the other treatment processes are optimized in order to eliminate *Cryptosporidium*. The intent of the LT2ESWTR is to reduce the risk of microbial disease by requiring additional treatment targeting *Cryptosporidium* [in those public water systems (PWSs) exhibiting higher levels of *Cryptosporidium* in their source water].

c. Related Regulations. The NPDWR contains a number of regulations that address microbial concerns. These existing regulations can be found in the Title 40, Code of Federal Regulations (CFR), Part 141, NPDWR (reference 1). Under the Surface Water Treatment Rule (SWTR), promulgated in 1989, drinking water treatment techniques were developed in lieu of maximum contaminant levels (MCLs) for viruses, bacteria and *Giardia lamblia* (reference 6). Using the combination of filtration and disinfection, PWSs had to demonstrate 3-log (99.9%) removal of *Giardia lamblia* and 4-log (99.99%) removal of viruses. This is determined using the concept of disinfectant contact time (CT) (concentration · contact time). The Interim Enhanced SWTR (IESWTR), promulgated in 1998, improved control of microbial pathogens, while also addressing the risk from disinfection byproducts. The IESWTR requires 2-log (99%) *Cryptosporidium* removal in PWSs that filter, tightened turbidity performance criteria and required individual filter monitoring (reference 5). This rule also includes disinfection benchmark provisions to assure continued levels of microbial protection while facilities take steps to comply with new DBP standards. The Long Term 1 Enhanced SWTR (LT1ESWTR), promulgated in 2002, is the small system equivalent of the IESWTR. It applies to PWSs serving less than 10,000 people treating surface water or groundwater under the direct influence (GWUDI) of surface water (reference 7).

## 5. UNDERSTANDING THE LT2ESWTR.

a. General. To reduce the incidence of illness associated with *Cryptosporidium* and other pathogenic organisms in drinking water, the EPA promulgated the LT2ESWTR on 5 January 2006 (reference 8). The rule incorporates a flexible, risk-based approach for microbial control and accounts for current water system treatment methods, source water quality, and size. The rule bolsters existing regulations, primarily the SWTR and IESWTR, and provides a higher level of microbial protection through several means. The LT2ESWTR applies to all PWSs supplied by surface water or GWUDI sources. Affected PWSs must conduct initial monitoring of their source water to determine *Cryptosporidium* levels. Monitoring results will then determine the assigned treatment category (filtered system) or level of required inactivation (unfiltered system). A system intending to significantly change their disinfection practice in response to the LT2ESWTR is required to undergo disinfection benchmark profiling. A second round of monitoring is required 6 years after the initial monitoring event to ensure there were no significant changes in source water quality that would change the assigned treatment category or level of inactivation. An additional LT2ESWTR requirement is that uncovered finished water storage reservoirs must either cover the reservoir or treat the water leaving the reservoir.

b. Affected Water Systems.

(1) U.S. PWSs. The LT2ESWTR applies to all PWSs using surface water or GWUDI (subpart H systems), including both community and non-community systems. Wholesale PWSs must comply with the LT2ESWTR based on the largest PWS in their combined distribution system (CDS). CDSs are interconnected distribution systems consisting of the wholesale system and the consecutive systems that receive the water. Consecutive water systems that purchase treated water from compliant wholesale PWSs are not required to perform any additional monitoring as stipulated by this rule. These PWSs are, however, required to comply with the uncovered reservoir requirement of the LT2ESWTR. Notifications from the EPA or State agency detailing source water monitoring requirements and schedule were received by PWSs serving  $\geq 50,000$  in February 2006 and should be received by PWSs  $< 50,000$  by July 2006 (reference 8).

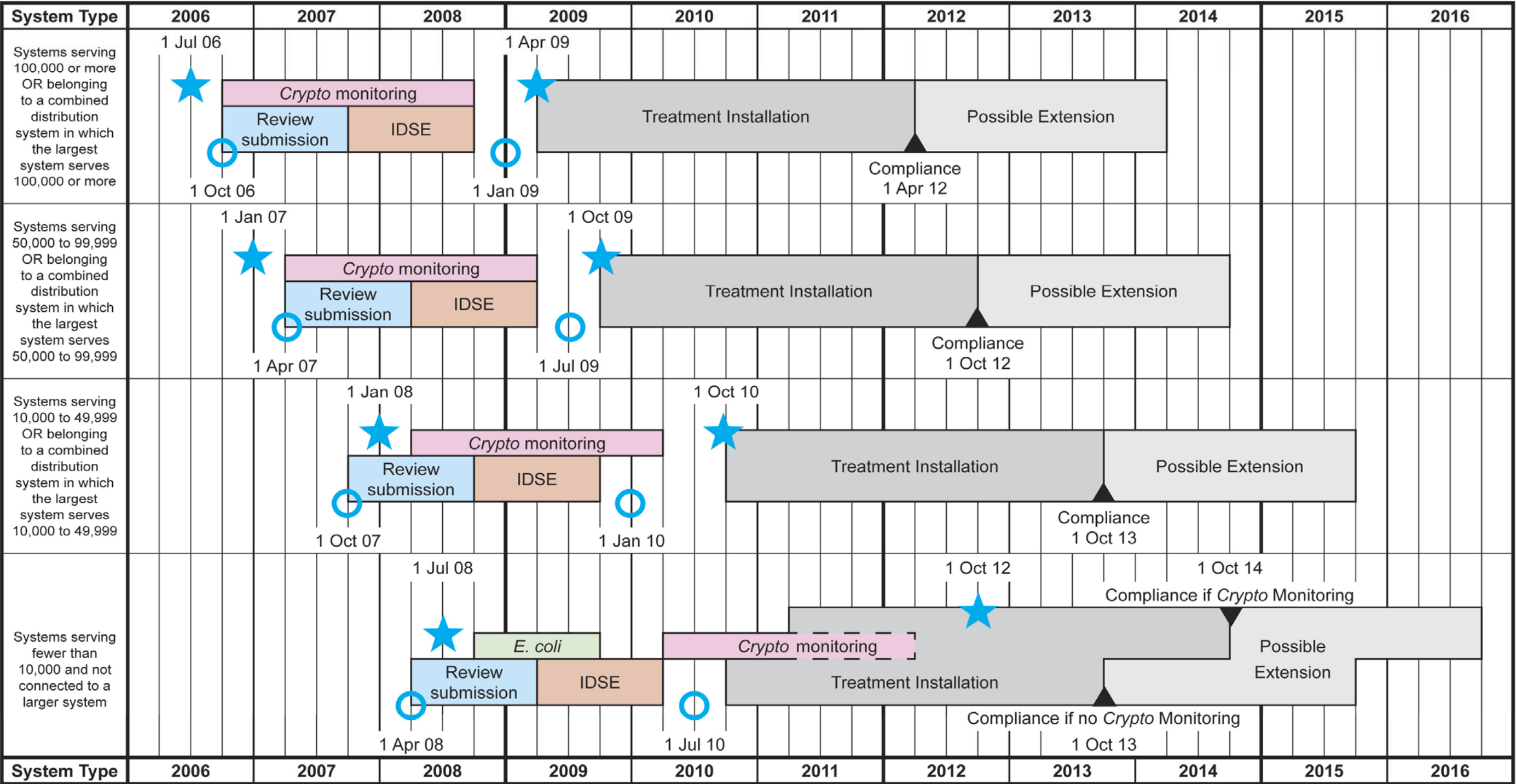
(2) Overseas PWSs. Overseas installations must comply with LT2ESWTR requirements as they are incorporated into the Overseas Environmental Baseline Guidance Document (OEBGD).

c. Compliance Timelines. Where applicable, compliance dates are included in the following text and displayed graphically in Figure 1. Additionally, Appendix C contains flowcharts to assist installation personnel in determining how the LT2ESWTR applies to their PWSs. The flowcharts in Appendix C also include significant compliance dates.

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FIGURE 1.

LT2ESWTR and Stage 2 DBPR Implementation Schedule



★ LT2 Plan or bin classification due

○ Stage 2 IDSE Plan or report due

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## 6. PROVISIONS OF THE LT2ESWTR

a. General. PWSs must submit sample schedules per the first requirement of the LT2ESWTR. Filtered PWSs serving  $\geq 10,000$  consumers are required to conduct initial monitoring for *Cryptosporidium*. Filtered PWSs serving  $< 10,000$  consumers are required to conduct initial monitoring for *E. coli*, following with *Cryptosporidium* monitoring, only if *E. coli* levels exceed specific trigger levels. All unfiltered PWSs are required to conduct initial source water monitoring for *Cryptosporidium* only.

(1) **Schedule Submission.** Sample schedules must be submitted no later than 3 months prior to the start date for initial monitoring (Table 1). PWSs serving  $\geq 10,000$  must submit their schedule to EPA electronically via the LT2ESWTR/Stage 2 Data Collection and Tracking System (DCTS), discussed in paragraph 6a(4). Smaller PWS sample schedules and all PWS second round monitoring results are to be reported to the State agency. As there is no formal approval process, PWSs should proceed with their monitoring whether or not a response is received. The sample schedule must specify the calendar dates the PWS will collect samples. Samples must be collected within 2 days before or after the date indicated in the sample plan. For example, if a sample is scheduled to be collected on Wednesday, 11 May, it may be collected any time between Monday, 9 May, and Friday, 13 May. PWSs should make every effort to sample on their specified sampling dates; however, if extreme circumstances prevent it, consult 40 CFR 141.702b.1-2 for more information. Monitoring violations may be assessed in the event a PWS fails to meet sample schedule, location, analytical method, laboratory, or reporting requirements.

**Table 1. Sample Schedule Submission Dates.**

Population Served	Submit NLT
50,000 – 99,999	January 2007
10,000 – 49,999	January 2008
$< 10,000$ (monitor for <i>E. coli</i> )	July 2008
$< 10,000$ (monitor for <i>Cryptosporidium</i> )	January 2010

(2) **Sampling Location.** Detailed sample location information must be submitted to the State agency at the same time the sample schedule is submitted. Further information is available in the EPA *Source Water Monitoring Guidance Manual for Public Water Systems for the Final Long Term 2 Enhanced Surface Water Treatment Rule* (reference 9). Initial monitoring samples must be collected in accordance with the following requirements.

- **Chemical Treatment:** Sample prior to any chemical treatment (e.g., coagulants, disinfectants, etc.).

- Filter Backwash: Sample prior to recycle points if filter backwash is recycled.
- Bank Filtration: Sample after the well, but prior to additional treatment, when additional subsequent filtration is used. If bank filtration is the only filtration provided, samples must be collected from the surface water source (e.g., the river).
- Multiple Sources: Sample from a tap where the source waters are combined and have not undergone any chemical treatment.
  - If no such sample point is available, the PWS may use a composite sample. The sample makeup should be reflective of the typical plant water makeup. For example, if a plant uses Source A for 20% of its water needs, and Source B for the remaining 80%, the 10 L required sample volume should be made up of 2 L of Source A and 8 L of Source B.
  - Conversely, a PWS may also analyze the sources separately and determine a weighted average of the results. Those PWSs with multiple sources that composite samples need to ensure they reflect plant operations at the time of sample collection.

(3) Sampling Methodologies/Laboratories. PWSs must have their source water samples analyzed for *Cryptosporidium* at an EPA-approved lab, using Method 1622 or 1623 (see Appendix D for a list of currently approved laboratories). Samples must use a 10 L volume or a packed pellet volume of 2 mL. For every 20 samples, one matrix spike sample must be analyzed (starting with the first sampling event) (reference 9). Therefore, for 24 samples over the course of 2 years, there must be at least two matrix spike samples included. Appendix E describes Method 1622/1623 sampling considerations, information and costs. The EPA Source Water Monitoring Guidance Manual provides in-depth explanation of sampling considerations (reference 9). For installations in need of a laboratory certified in *Cryptosporidium* analysis, the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) laboratories are able to coordinate this analysis through a certified contract laboratory (<http://usachppm.apgea.army.mil/dls/>). For more information the laboratory Technical Consultant may be contacted at (410) 436-2208. The *E. coli* monitoring is not nearly as complex as *Cryptosporidium* monitoring, but still has specific data quality requirements. An EPA or State-certified laboratory approved to measure total or fecal coliforms under 40 CFR 141.74 must be used to conduct the analysis. For LT2ESWTR purposes, samples must be quantified (i.e., bacterial colonies must be enumerated instead of a presence/absence test). The required turbidity samples must be analyzed by a State-approved party using the methods listed in 40 CFR 141.74(a)(1) (reference 8).

(4) Data Collection and Tracking System. The DCTS assists PWSs, EPA, State agencies, and laboratories to track and manage the data generated by the LT2ESWTR. The system will function primarily as a clearinghouse for *Cryptosporidium*, *E. coli*, and turbidity

data. All PWSs serving  $\geq 10,000$  people must submit their sample schedules and source water monitoring results to EPA electronically via DCTS (see Table 2) (reference 10). PWSs serving  $< 10,000$  must submit their sample schedules and report their source water monitoring results to the respective State agency. PWSs may also submit data to be grandfathered via DCTS. All PWSs should encourage their laboratories to submit their monitoring results electronically by uploading the data directly into DCTS. Laboratories upload results into DCTS; PWSs subsequently review and approve their laboratory-reported data. Instructions on how DCTS is used and how to obtain a username and password are available at [www.epa.gov/safewater/disinfection/tools/tools-dcts.html](http://www.epa.gov/safewater/disinfection/tools/tools-dcts.html).

**Table 2. Options for LT2ESWTR Submissions.**

Option 1 ( <i>Preferred</i> )	Option 2	Option 3
Upload directly to DCTS	Mail to: USEPA-IPMC P.O. Box 98 Dayton, OH 45401*	Email electronic submissions as attachments to <a href="mailto:stage2mdbp@epa.gov">stage2mdbp@epa.gov</a> *

\*with prior approval from the primacy agency

b. Initial Monitoring.

(1) Filtered PWSs Serving  $\geq 10,000$ . Large filtered PWSs, serving  $\geq 10,000$ , are required to sample at least monthly for *Cryptosporidium*, *E. coli* and turbidity for a period of 24 months. PWSs may increase their sampling frequency, but it must be evenly spaced throughout the monitoring period. The benefit of increased monitoring frequency is that when PWSs sample at least twice per month, they are able to use a less conservative calculation to determine the proper treatment bin. Table 3 and the Appendix C flowcharts provide dates by which PWSs must begin monitoring.

(2) Filtered PWSs Serving  $< 10,000$ . Monitoring requirements for small filtered PWSs serving  $< 10,000$  are comprised of two phases. Initially, the PWSs must monitor for *E. coli* at least once every 2 weeks for a period of 12 months. This monitoring establishes the background levels of *E. coli*, which is considered a sufficient indicator organism for determining further monitoring for *Cryptosporidium*. The PWS must conduct the second phase of monitoring for *Cryptosporidium* only if they exceed certain criteria:

- If the PWS source is a lake/reservoir and the annual mean *E. coli* concentration is  $> 10$  *E. Coli*/100 ml
- If the PWS source is a flowing stream source and the annual mean *E. coli* concentration is  $> 50$  *E. coli*/100 ml



- If the PWS uses a GWUDI source it must comply based on requirements associated with *E. coli* levels in the nearest surface water body; if no surface water body is nearby, the PWS must comply based on the lake/reservoir source requirements

If the levels of *E. coli* indicate a PWS must complete the second phase of monitoring for *Cryptosporidium*, they must sample at one of two frequencies:

- At least twice per month for 1 year
- At least once per month for 2 years

The same treatment compliance dates apply (Table 3 and the Appendix C flowcharts), regardless of which sampling frequency the PWS chooses. That is, the *Cryptosporidium* treatment compliance date is not extended for a system choosing the 2-year monitoring option.

(3) Unfiltered PWSs. Monitoring requirements are slightly different for PWSs that do not employ any filtration as part of the treatment process. Large unfiltered PWSs (serving  $\geq 10,000$  people) must sample at least monthly for *Cryptosporidium* for 2 years. However, they are not required to conduct concurrent *E. coli* or turbidity monitoring. These PWSs can conduct more frequent *Cryptosporidium* monitoring, but are not allowed to use the more conservative calculation to determine inactivation levels (bin placement) and subsequent treatment requirements. Unfiltered PWSs serving  $< 10,000$  must conduct *Cryptosporidium* monitoring – they do not have the option of first conducting indicator organism screening. These PWSs may either sample twice per month for 1 year, or once per month for 2 years. Regardless of which sampling frequency is chosen, the same treatment compliance dates will still apply (Table 3 and Appendix C flowcharts).

**Table 3. Initial Source Water Monitoring Schedule.**

<b>Population Served</b>	<b>Begin NLT:</b>
50,000 – 99,999	April 2007
10,000 – 49,999	April 2008
$< 10,000$ (monitor for <i>E. coli</i> )	October 2008
$< 10,000$ (monitor for Crypto)	April 2010

(4) Seasonal Plants. PWSs that only operate for part of the year must conduct their sampling only during the months the plant is in operation. If the plant operates less than 6 months of a year and is required to monitor for *Cryptosporidium*, the plant must collect at least six *Cryptosporidium* samples per year during both years of the 2-year requirement. The State agency may stipulate at what frequency a PWS must monitor in these situations.

(5) **Monitoring Avoidance.** There are circumstances under which PWSs would not be required to conduct the initial monitoring. Filtered PWSs that plan to provide at least 5.5-log treatment for *Cryptosporidium* and unfiltered PWSs that plan to provide at least 3-log treatment for *Cryptosporidium* do not have to monitor. In either case, the PWS would be required to notify the State agency in writing no later than the sampling schedule submission date (see Table 1), and install and operate technologies to provide this treatment by the appropriate treatment compliance date (see Appendix C flowcharts). A filtered PWS serving < 10,000 may omit *E. coli* monitoring, provided they notify the State agency no later than 3 months prior to the date the system would otherwise begin monitoring for *E. coli*. In addition, they must conduct the required *Cryptosporidium* monitoring at a frequency of least twice per month for 12 months or at least monthly for 24 months.

(6) **Reporting/Recordkeeping.** There are various reporting and recordkeeping requirements Army PWSs must be aware of under the LT2ESWTR regarding initial monitoring.

- PWSs  $\geq 10,000$  submit sampling schedules to EPA electronically through the DCTS; PWSs serving < 10,000 report their monitoring results to the State agency.
- Monitoring results must be reported no later than 10 days after the end of the month in which a PWS sampled.
- The PWSs must report their bin classification for approval no later than 6 months after the end of the scheduled monitoring period.

(7) **Grandfathered Data.** PWSs may use previously collected data to comply with the initial monitoring requirements. Due to the number of PWSs that must conduct monitoring and the limited number of certified laboratories, PWSs should strongly consider sampling early and grandfathering the data. However, the PWS will first need State agency approval and results must be the same number of samples, frequency and data quality as required in LT2ESWTR. *Cryptosporidium* and *E. coli* samples must meet analytical and laboratory requirements as well as the sampling location requirements of LT2ESWTR. *Cryptosporidium* samples must have been collected at least once a month on a regular schedule, no earlier than January 1999. The intent to grandfather data must be reported no later than 3 months before the start of initial monitoring. PWSs must report the number of previously collected samples, dates of the first and last samples, and whether additional monitoring will need to be conducted. The grandfathered data must be reported 2 months after the start date for initial monitoring. PWSs serving  $\geq 10,000$  submit their data electronically to EPA; PWSs serving < 10,000 submit to their State agency.

c. Second Round Monitoring. PWSs must conduct second round monitoring 6 years after bin classification or level of inactivation from the initial round of monitoring. This monitoring will determine if source water quality has significantly changed. The monitoring schedule is shown in Table 4.

**Table 4. Second Round Monitoring Schedule.**

<b>Population Served</b>	<b>Begin NLT:</b>
50,000 – 99,999	October 2015
10,000 – 49,999	October 2016
< 10,000 & monitor for <i>E. coli</i>	October 2017
< 10,000 & monitor for Crypto	April 2019

d. Monitoring Guidance. EPA has published the *Source Water Monitoring Guidance Manual for Public Water Systems for the Final Long Term 2 Enhanced Surface Water Treatment Rule* to assist PWSs in all aspects of monitoring ([http://www.epa.gov/safewater/disinfection/lt2/pdfs/guide\\_lt2\\_swmonitoringguidance.pdf](http://www.epa.gov/safewater/disinfection/lt2/pdfs/guide_lt2_swmonitoringguidance.pdf)). It provides a wealth of information relating to laboratory contracting, sample collection procedures, data review and interpretation, and grandfathering requirements.

e. Calculating *Cryptosporidium* Concentrations. To analyze a water sample for *Cryptosporidium*, the water volume is filtered to trap the oocysts (the environmental life stage of *Cryptosporidium*). After a number of procedures to isolate the organism, a microscopic exam must be performed to identify and count the oocysts present. A calculation determines the oocysts/L of original sample. The PWS must calculate individual sample concentrations to determine the bin concentration:

$$\frac{\text{Total number of oocysts counted}}{\text{Volume assayed}} = \text{Individual sample concentration}$$

If no oocysts were detected in the sample, this is considered a zero value. The method recovery and whether oocysts are infectious does not factor into the calculation. After individual sample concentrations are used to determine the bin concentration, bin placement or level of inactivation and subsequent additional treatment requirements may be determined.

f. Unfiltered PWSs and Inactivation Requirements. The LT2ESWTR requires all unfiltered PWSs using surface water or GWUDI to provide a certain level of treatment for *Cryptosporidium*, dependant on how much *Cryptosporidium* is found during initial monitoring. In addition, these PWSs must use at least two disinfectants to meet LT2ESWTR requirements, while continuing to meet filtration avoidance criteria. Each disinfectant must achieve (by itself) the total inactivation required for one of the target pathogens (viruses, *Giardia* and

*Cryptosporidium*). Following initial monitoring, unfiltered PWSs must calculate the mean of all *Cryptosporidium* sample concentrations and report to the State agency no later than 6 months after the initial monitoring period. In addition to the *Cryptosporidium* data, PWSs must include source water data (i.e., *E. coli*, temperature, turbidity) outlined in EPA's Source Water Monitoring Guidance Manual (reference 9). If the number of samples collected each month varies, calculate the monthly average for each month, then calculate the mean using the monthly averages (as required for filtered PWSs). Failing to comply with the LT2ESWTR requirements constitutes a treatment technique violation. Unfiltered PWSs must comply with the inactivation requirements in Table 5.

**Table 5. Unfiltered System Inactivation Requirements.**

<b><i>Cryptosporidium</i> Level (oocysts/L)</b>	<b>Inactivation Requirements</b>
$\leq 0.01$	At least 2-log
$> 0.01$	At least 3-log

g. Filtered PWSs and Bin Placement. Once filtered PWSs have conducted initial monitoring, they can determine which treatment bin requirements will apply. Filtered PWSs will be placed in one of four different bins – Bin 1 would not require any further treatment and Bin 4 would require the most extensive additional treatment requirements. The PWS must be sure to report their bin classification or level of inactivation to the State agency for approval no later than 6 months after completion of their first round monitoring (this applies to second round monitoring, as well). The information reported to the State agency must include a summary of the source water monitoring data and the calculation procedure used to classify the system. Failure to report is considered a treatment technique violation. After determining bin placement, PWSs may choose from the “microbial toolbox” to fulfill the additional requirements (if any) of their bin placement. The microbial toolbox is a list of treatment processes and management practices that PWSs may choose from if required to provide additional treatment. Though the microbial toolbox offers a broad range of flexibility in additional treatment measures, there are many factors that must be considered when selecting the best option (e.g., water quality, technology complexity, safety, regulatory compliance, and cost). An in-depth water system study may be needed to evaluate available compliance alternatives and determine which alternative would best suit the PWS.

(1) Determining Bin Concentration. Determining bin concentration depends in part on how many *Cryptosporidium* samples a PWS analyzed (Table 6). EPA structured the calculations so that PWSs that analyzed at least two samples per month for 2 years (48 or more samples) use a less conservative bin concentration calculation. There are also separate provisions for small

PWSs (serving < 10,000) and plants that operate only part of the year (seasonal plants). PWSs that conducted initial monitoring for *E. coli* and did not have to conduct subsequent sampling for *Cryptosporidium* are automatically placed in Bin 1.

**Table 6. Bin Concentration Determination.**

Number of Samples	Bin Concentration Determination
24 – 47 samples over 2 years	Highest arithmetic mean of all sample concentrations in any 12 consecutive months
48+ samples over 2 years	Arithmetic mean of all sample concentrations
PWSs serving < 10,000 (24 samples in 12 months)	Arithmetic mean of all sample concentrations
Seasonal PWSs (variable number of samples)	Highest arithmetic mean of all sample concentrations in any year of monitoring

(2) Additional Treatment. If a PWS is classified in bins 2 – 4, they must implement additional treatment, with bin classifications requiring progressively higher levels of treatment (Table 7). The total treatment that would be required is 4.0-log, 5.0-log, and 5.5-log for bins 2, 3, and 4, respectively. Those PWSs using conventional treatment (i.e., coagulation/flocculation, clarification, and granular media filtration) receive a 3-log treatment credit that counts towards the total bin treatment requirements, and direct filtration plants receive a 2.5-log credit. State agencies have the flexibility to award different levels of treatment credit, and also will assign treatment credit to those PWSs using alternative filtration technologies. Although PWSs placed in Bin 2 may use any option from the toolbox to comply with required treatment techniques, PWSs placed in bins 3 and 4 must achieve at least 1-log of the additional treatment using ozone, chlorine dioxide, ultraviolet (UV), membranes, bag filtration, cartridge filtration, or bank filtration.

**Table 7. Bin Placement and Treatment Requirements.**

Bin Concentration (oocysts/L)	Bin Classification	Additional Treatment Requirements	
		Conventional, Diatomaceous Earth, Slow Sand Filtration	Direct Filtration
< 0.075	1	No additional treatment	
0.075 – 1.0	2	1-log <sup>1</sup>	1.5-log
1.0 – 3.0	3	2-log <sup>2</sup>	2.5-log
3.0 or higher	4	2.5-log <sup>2</sup>	3-log

<sup>1</sup> PWSs may use any technology or combination of technologies from the microbial toolbox in Section IV.D of the LT2ESWTR (reference 8)

<sup>2</sup> PWSs must achieve at least 1-log using ozone, chlorine dioxide, ultraviolet, membranes, bag filtration, cartridge filtration, or bank filtration

h. Toolbox Options. The microbial toolbox includes a variety of options, from control to treatment, for use in complying with the LT2ESWTR treatment requirements. There are five categories of options: (1) source protection/management; (2) prefiltration; (3) treatment performance; (4) additional filtration, and (5) inactivation options. Within each category, there are generally several options that PWSs may implement, with varying treatment credits (see Table 8). By following design and operational criteria, PWSs are in compliance with implementation of these options that are further described in the LT2ESWTR Final Rule. The rule allows further operational flexibility by allowing PWSs to use different toolbox options during different months of the year with State agency approval. This is beneficial for PWSs that may not be able to meet criteria for certain toolbox options for the entire year. In addition to the flexibility of multiple options, State agencies have the flexibility to award treatment credits that are higher or lower than the prescribed credit, based on demonstration of performance by the PWS.

(1) Source Protection. EPA has allotted two options in the source protection category to comply with LT2ESWTR requirements: watershed control program and alternate source monitoring.

- Filtered PWSs may use a **watershed control program** to receive a 0.5-log treatment credit. The State agency must be notified of a system's intent to use watershed control as treatment credit no later than 2 years prior to the treatment compliance deadline, and a proposed watershed plan must be submitted no later than 1 year prior to the compliance date. The plan must include several items: designated area of influence; potential and actual *Cryptosporidium* sources; analysis of control measures, their relative effectiveness in reducing loading and the feasibility of these measures; as well as goals and specific actions to be taken to reduce source water *Cryptosporidium* levels. To maintain the credit, PWSs need to submit annual program status reports to the State agency and conduct regular watershed surveys. Unfiltered PWSs are not eligible for this credit because they are already required to maintain a watershed control program.
- If PWS is concerned that *Cryptosporidium* levels from their normal intake may be sufficiently high to warrant additional treatment requirements, they have the option of simultaneously monitoring at an **alternate source**. Following the initial monitoring, the PWS may request the State agency approve the plant's bin classification based on the alternate source and its monitoring results. If the State agency approves the alternate source, the PWS must relocate the intake to reflect the alternate source monitoring. There is no prescribed credit for this option – the State agency has the flexibility to assign a credit they find to be representative.

**Table 8. Microbial Toolbox Options, Credits and Criteria Summary.**

<b>Toolbox Option</b>	<b>Crypto Treatment Credit with Design/Operational Criteria</b>
<b>Source Protection/Management</b>	
Watershed control program	0.5-log credit; must include required elements, annual program status report to State, regular watershed survey (unfiltered PWSs not eligible)
Alternative source/intake	No prescribed credit; PWSs may monitor simultaneously at an alternative intake during initial monitoring for bin classification
<b>Prefiltration</b>	
Presedimentation basin with coagulation	0.5-log credit during months that pre-sedimentation basins achieve $\geq 0.5$ -log monthly mean reduction in turbidity (or other State agency approved criteria)
Two-stage lime softening	0.5-log credit for 2-stage softening where chemical addition and hardness precipitation occur in both stages (all plant flow must pass through both stages); single-stage softening credited as equivalent to conventional treatment
Bank filtration	0.5-log credit for 25-ft setback, 1.0-log credit for 50-ft setback; horizontal and vertical wells only, average well turbidity $< 1$ NTU; if existing wells followed by filtration, PWS must monitor well effluent for bin classification (not eligible for additional credit)
<b>Treatment Performance</b>	
Combined filter performance	0.5-log credit for combined filter effluent turbidity $\leq 0.15$ NTU in at least 95% measurements each month
Individual filter performance	0.5-log credit (in addition to above performance) if individual filter effluent turbidity $\leq 0.15$ NTU in at least 95% measurements each month and never $> 0.3$ NTU in 2 consecutive measurements in any filter
Demonstration of performance	Credit awarded based on demonstration of performance to State agency
<b>Additional Filtration</b>	
Bag & cartridge filters	Up to 2-log credit if $\geq 1$ -log removal in challenge test used singly; up to 2.5-log credit if $\geq 0.5$ -log removal in challenge test used in series
Membrane filtration	Credit equivalent to removal efficiency in challenge test (if supported by direct integrity testing)
Second stage filtration	0.5-log credit for 2 <sup>nd</sup> separate granular media filtration stage (if treatment includes coagulation prior to 1 <sup>st</sup> filter)
Slow sand filters	2.5-log credit as secondary filtration step; 3.0-log credit if primary filtration (no prior chlorination for either option)
<b>Inactivation</b>	
Chlorine dioxide	Credit based on measured CT in relation to CT table
Ozone	Credit based on measured CT in relation to CT table
UV	Credit based on validated UV dose in relation to UV dose table; reactor validation testing required (establish UV dose, associated operating conditions)

(2) Pre-filtration. EPA has provided three options in the pre-filtration category, including pre-sedimentation with coagulant, two-stage lime softening, and bank filtration.

- Plants may receive 0.5-log credit for meeting the various requirements under the **pre-sedimentation with coagulant** option. All flow reaching the treatment plant must be treated and a coagulant must be added continuously to the pre-sedimentation basin. In addition, one of two performance criteria must be met: (1) demonstrate 0.5-log mean reduction of influent turbidity, and (2) demonstrate at least 0.5-log mean removal of micron-sized particulate material in compliance with State agency-approved performance criteria. PWSs may also seek credit by demonstration of performance to the State agency if they do not meet the performance criteria to receive treatment credit. This option may also be used for PWSs seeking greater than 0.5-log credit. To maintain credit for pre-sedimentation, PWSs must verify continuous basin operation, treatment of 100% of flow, continuous coagulant addition, and at least 0.5-log turbidity reduction on a monthly basis to the State agency.
- **Two-stage softening** enables a PWS to receive an additional 0.5-log credit as long as certain conditions are met: (1) chemical addition and hardness precipitation occur in both stages, and (2) all plant flow must pass through both stages (no bypassing). To maintain credit, plants must report monthly verification of chemical addition and precipitation, and treatment of 100% plant flow through both stages. Plants may apply to the State agency for *Cryptosporidium* treatment credit through demonstration of performance.
- A PWS may receive credit for **bank filtration**. The credit assigned is primarily dependant on the distance the ground water flows before reaching the pumping well. A 0.5-log credit may be awarded for a 25-foot setback from the surface water and a 1.0-log credit is awarded for a 50-foot setback. Only wells in granular aquifers are eligible for treatment credit. The average turbidity must be measured every 4 hours while the PWS is using bank filtration, and cannot exceed 1 nephelometric turbidity unit (NTU). Note that PWSs monitoring after bank filtration for bin placement purposes are not eligible for this credit (i.e., PWSs that use bank filtration as pretreatment to a filtration plant). Reporting requirements associated with bank filtration include initial demonstration of aquifer composition and setback distance, as well as reporting any monthly average turbidity results greater than 1 NTU. Average turbidity levels above 1 NTU trigger an assessment to determine the cause with a subsequent report submission to the State agency within 30 days. Plants may apply to the State agency for *Cryptosporidium* treatment credit through demonstration of performance; the credit may be greater than 1.0-log.



(3) Treatment Performance. This category has three options that PWSs may use: (1) combined filter performance, (2) individual filter performance, and (3) demonstration of performance.

- For PWSs using conventional or direct filtration, they may receive a 0.5-log credit if the **combined filter effluent turbidity** levels are  $\leq 0.15$  NTU in at least 95% of the measurements taken in a month. Other types of filtration treatment (e.g., slow sand, diatomaceous earth) are not eligible for this credit. Monthly verification of the turbidity levels must be submitted to the State agency.
- PWSs may receive a 0.5-log credit during any month **individual filter effluent turbidity** is  $\leq 0.15$  NTU in at least 95% of the measurements taken in a month and is not  $> 0.3$  NTU in two consecutive measurements in any filter. As with the combined filter effluent turbidity option, this credit is not applicable to other types of filtration treatment. Monthly verification of the turbidity levels must be submitted to the State agency.
- **Demonstration of performance** is a means by which a PWS may receive credit for a particular unit process or treatment train based on a demonstration to the State agency with a State agency-approved protocol. This process may award a credit for *Cryptosporidium* removal higher than a prescribed credit or for a process that is not included in the microbial toolbox. If a PWS receives demonstration of performance credit for a process, that process is not eligible for an additional prescribed treatment credit for that particular process. PWSs must report results from the State agency-approved protocol as well as verify to the State agency monthly that they are operating within State agency-approved conditions.

(4) Additional Filtration. PWSs are provided four different options with respect to additional filtration to meet LT2ESWTR requirements, including bag or cartridge filters, membrane filtration, second stage filtration, or slow sand filters. The State agency must approve treatment credit based on an assessment of the design characteristics of the filtration process for these technologies.

- **Bag or cartridge filters** used as additional filtration may receive up to a 2.0-log credit for an individual filter, and 2.5-log credit for two or more filters operated in series. Bag and cartridge filters are pressure-driven separation devices that remove particulate matter larger than 1 micrometer with an engineered porous filtration media. Credit is awarded based on removal efficiency during challenge testing. The challenge testing serves to establish removal efficiency. States determine the removal efficiency of the filters, then subtract a 1.0-log safety factor for individual filters and a 0.5-log safety factor for filters in series. That is, filters must provide a 3.0-log removal to be awarded maximum credit. PWSs

must demonstrate and report to the State agency that the process meets the definition of that particular technology, verify removal efficiency, and that 100% of plant flow was filtered.

- **Membrane filtration** is a pressure or vacuum driven process where particulate matter larger than 1 micrometer is rejected by an engineered barrier. Credit is awarded based on the removal efficiency as determined in challenge testing and direct integrity testing. If a PWS installs membranes that have already undergone challenge testing, they are not required to conduct the challenge testing (testing is product-specific, not site-specific). After installing membranes, PWSs must undergo periodic direct integrity testing (not less than once per day) to demonstrate removal efficiencies at or greater than the removal credit awarded to the membrane filtration processes. Direct integrity testing is a physical test that is applied to the membrane unit so integrity breaches (leaks) may be identified. The verification test results must be reported to the State agency, in addition to monthly reports summarizing any data that exceeded applicable parameters in direct or indirect integrity testing.
- **Second stage filtration** allows a system to earn a 0.5-log treatment credit if certain requirements are met. The filtration must be a separate granular media filtration (e.g., sand, dual media, granular activated carbon) that follows either conventional treatment or direct filtration. The plant must undergo coagulation prior to the first filter and both filters must treat 100% of the plant flow. However, the PWS cannot receive additional credit for both second stage filtration and reduced filter effluent turbidity that is based on turbidity readings following the second stage filtration. PWSs must verify monthly that 100% of plant flow was filtered through both stages and that the first stage was preceded by coagulation.
- **Slow sand filtration** as a secondary filtration step following conventional treatment or direct filtration allows PWSs to receive a 2.5-log credit (a 3.0-log is awarded if used as the primary filtration process). In either case, prechlorination is not allowed since a chlorine residual may disturb the necessary biological activity of the filters. Additionally, 100% of the plant flow must undergo both filtration stages. PWSs must provide monthly verification of the filtration treatment to the State agency.

(5) Inactivation. There are three options in this category to meet LT2ESWTR requirements: (1) ozone, (2) chlorine dioxide, and (3) UV light technology. Unfiltered PWSs must use at least two disinfectants, with at least one option from this category when implementing additional treatment.

- **Ozone and chlorine dioxide** may be used to meet LT2ESWTR treatment requirements, under specific conditions. Both have been found to be effective

means of treatment with respect to *Cryptosporidium*. To achieve treatment credit, PWSs must meet the following: water temperature must be measured once a day at each residual disinfectant concentration sample point; CT must be calculated for each day during peak hourly flow, and residual disinfectant concentrations (before or at the first customer tap) must be measured every day during peak hourly flow. The CT is the product of the residual disinfectant **concentration** (C) in mg/L, measured at the site of the first consumer served after disinfection, and the corresponding disinfecting (i.e., contact) **time** (T) in minutes. Tables IV.D-3 or IV.D-4 (CT values for *Cryptosporidium* inactivation by ozone and chlorine dioxide, respectively) of the LT2ESWTR must be used to determine the inactivation credit. If a PWS has several disinfection segments in their treatment train, CT may be calculated for each segment; the sum will determine the log inactivation achieved throughout the plant. A disinfection segment is defined as a treatment unit process with a measurable disinfectant level and a liquid volume. The daily summary of CT values must be provided to the State agency within 10 days following the month in which the monitoring was conducted.

- **UV** is also effective in inactivation of *Cryptosporidium*; as such, UV may be used to receive treatment credit. Before a system implements UV, UV reactor validation testing must be performed, either in a laboratory or on-site. Conducting the testing will determine the operating conditions for delivering the required UV dose. Parameters to be tested include flow rate, UV intensity, and UV lamp status. The UV log credit will depend on the validated UV dose in relation to the dose table (Table IV.D-5 in the LT2ESWTR). After validation of the reactor, subsequent reactor monitoring ensures the reactor is operating within validated conditions. The LT2ESWTR also requires at least 95% of the plant flow must be treated by UV reactors within validated conditions. PWSs must submit a monthly report to the State agency specifying the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose.

i. Disinfection Benchmarking.

(1) **Applicability.** Disinfection profiling and benchmarking are used to determine the existing levels of disinfection, and subsequently ensures that there will be no significant reduction in microbial protection due to modifying disinfection practices. Disinfection profiling and benchmarking only applies to those PWSs that, based on their initial monitoring, intend to make a significant change to their disinfection process. It is the link between the Stage 2 and LT2ESWTR. It allows PWSs to demonstrate they are striking the proper balance between disinfecting sufficiently to protect against pathogens and simultaneously avoiding excessive

levels of disinfection byproducts. A “significant change” to a system’s disinfection practice may include moving the point of disinfection, type of disinfectant used, or any other change as designated by the State agency.

(2) Disinfection profile. This first step in benchmarking is creating a disinfection profile. This is accomplished by documenting *Giardia lamblia* and virus inactivation levels weekly for 12 consecutive months. PWSs must use operational and water quality data [e.g., disinfectant residuals, contact times, temperatures, and pH (where necessary)] and determine the total log inactivation throughout the entire plant. Data may be grandfathered, if available. For example, if a system created a disinfection profile for *Giardia* under the IESWTR or LT1ESWTR, they may use this operational data to create their virus profile.

(3) Determining the benchmark. In order to calculate a benchmark, the system must determine the lowest mean monthly level of *Giardia* and virus inactivation for each year of profiling data:

$$\frac{\text{Sum of daily/weekly } \textit{Giardia} \text{ or virus log inactivation}}{\text{Number of values calculated for the month}} = \text{Mean monthly level } \textit{Giardia} \text{ or virus inactivation}$$

For PWSs with 1 year of data, the benchmark becomes the lowest monthly mean value. If the system has multiple years of data, their benchmark is the mean of the lowest monthly mean values. The EPA Disinfection Profiling and Benchmarking Guidance Manual (<http://www.epa.gov/safewater/mdbp/mdbptg.html#bench>) provides further information on profiling and benchmarking (reference 11). If a system made a significant change to their disinfection process or changed their water source since gathering profile data, they must profile again. Plants operating only part of the year must collect data only during the months in operation.

j. Uncovered Storage Reservoirs. Any Army PWSs with uncovered finished water storage reservoirs must either cover the reservoir or treat the water (i.e., equivalent to surface or GWUDI water system) leaving the reservoir. In other words, treatment must achieve appropriate inactivation rates and/or removal of 4-log virus, 3-log *Giardia lamblia*, and 2-log *Cryptosporidium*. PWSs must notify the State agency of any uncovered finished water reservoirs no later than 1 April 2008, and must cover the reservoir or treat the water leaving the reservoir or implement a State agency-approved compliance schedule no later than 1 April 2009 to meet these requirements.

## 7. ASSISTIVE GUIDANCE.

a. EPA Guidance. The EPA LT2ESWTR website provides many links to LT2ESWTR information ([www.epa.gov/safewater/disinfection/lt2/index.html](http://www.epa.gov/safewater/disinfection/lt2/index.html)). Besides access to guidance

manuals and factsheets (see Appendix F), the website also contains the rule as published in the Federal Register and a link to the DCTS.

(1) EPA guidance documents may be found and downloaded from [www.epa.gov/safewater/disinfection/lt2/compliance.html](http://www.epa.gov/safewater/disinfection/lt2/compliance.html). Descriptions of the documents are found in Appendix F. They cover a variety of issues regarding source water monitoring, microbial toolbox, and a variety of specific microbial toolbox options. Factsheets available, including source water monitoring, DCTS, and laboratory issues. EPA also developed an online Microscopy Training Module designed to assist analysts, as well as a Sample Collection Training Module to provide information on proper sample collection (<http://www.epa.gov/safewater/lt2/training/index.html#>).

(2) Listserv, accessible at [www.epa.gov/ow/info.html#list](http://www.epa.gov/ow/info.html#list), is an EPA service where those involved with water compliance may register to receive various updates and reminders via email. There is also a searchable question and answer section located at [www.epa.gov/ogwdw/drinklink.html](http://www.epa.gov/ogwdw/drinklink.html). Users may submit questions if they cannot find a particular topic. Questions regarding the LT2ESWTR may also be emailed to the EPA LT2ESWTR implementation team at [stage2mdbp@epa.gov](mailto:stage2mdbp@epa.gov).

(3) EPA will be offering 2-day training events throughout 2006 focusing on the early requirements of the LT2ESWTR and Stage 2 rules ([www.epa.gov/safewater/disinfection/training.html](http://www.epa.gov/safewater/disinfection/training.html)). Webcast training registration is also available from this website. EPA will have training modules, such as the Online Microscopy Training Module, available at [www.epa.gov/ogwdw/lt2/training/modules.html](http://www.epa.gov/ogwdw/lt2/training/modules.html).

b. Technical Guidance. USACHPPM, Water Supply Management Program (<http://usachppm.apgea.army.mil/dehe/pgm31/>) is available to provide technical assistance to those installations that must comply with the LT2ESWTR and Stage 2 rules. Subject matter experts can assist Army PWSs in evaluating which treatment modifications or operational changes are most effective to ensure compliance with the rules and subsequently continue to provide high quality drinking water. Laboratory support for both rules can be provided through the USACHPPM laboratories.

c. Industry Guidance. The American Water Works Association (AWWA) has various avenues for LT2ESWTR information including webcast training and seminars exploring treatment technologies ([www.awwa.org](http://www.awwa.org)). The Association of Metropolitan Water Agencies (AMWA) has compiled a number of helpful links with respect to the LT2ESWTR ([www.amwa.net/mdbp/index.html](http://www.amwa.net/mdbp/index.html)).

## 8. IMPACT ON ARMY WATER SYSTEMS.

a. Applicability. The LT2ESWTR is a complex rule that applies to all PWSs using a surface water or GWUDI source. Army consecutive PWSs will not be required to comply with the LT2ESWTR, provided they are in compliance with the requirement to cover any uncovered reservoirs and their wholesale supplier is fully compliant with the applicable LT2ESWTR requirements. However, some State agencies may require additional requirements beyond those in the NPDWR. Overseas Army installations are expected to comply with the LT2ESWTR in the future, upon revision of the OEBGD. PWSs should have received notification of monitoring requirements and schedule no later than February 2006 for PWSs serving  $\geq 50,000$  and July 2006 for PWSs serving  $< 50,000$ . Table 9 lists the Army PWSs that may be affected by the LT2ESWTR.

b. Rule Requirements.

(1) Army PWSs using surface water or GWUDI will have to conduct monitoring (either *E. coli* or *Cryptosporidium*), or take steps to grandfather data already accrued. The USACHPPM laboratories can provide support for *Cryptosporidium* monitoring for installations in need of primary or backup certified laboratory support. Depending on the outcome of the monitoring, the system may have to implement additional treatment and conduct disinfection profiling/benchmarking.

(2) Source water monitoring requirements do not apply to purchased PWSs if the water received from the wholesale system has been monitored and treated. However, they must comply with the uncovered finished water storage reservoir requirement. PWSs in a CDS (that are not part of a wholesale system) are required to monitor based on their own population served; they are not affected by the size of their suppliers. State agencies have already defined these interconnected wholesale and consecutive system relationships.

(3) EPA granted State agencies a great deal of flexibility in implementing the LT2ESWTR, so Army PWSs would benefit in creating a good working relationship/partnership with their State agency with respect to this rule. Overseas installations must comply as LT2ESWTR requirements are incorporated into the OEBGD.

## 9. ACTIONS FOR ARMY WATER SYSTEMS.

a. Resource Planning.

(1) Plan for associated LT2ESWTR-associated costs well ahead of any significant requirements, such as monitoring costs or additional treatment requirements. Arrange contracts

**Table 9. Army PWSs Potentially Affected by the LT2ESWTR.**

Command	Subcom	Org Name	Permit Id	System Name	Population Served	GWUDI	SW	GWUDI
AMC	AFSC	BLUE GRASS ARMY DEPOT	170	Blue Grass Army Depot Public Water Supply	800		Y	
AMC	AFSC	HAWTHORNE ARMY DEPOT	1346	HWAD SURFACE WATER SYSTEM	584		Y	
AMC	AFSC	KANSAS AAP	4796	KAAP Public Water Supply	250		Y	
AMC	AFSC	MCALESTER AAP	6079	McAlester Army Ammunition Plant	1500		Y	
AMC	AFSC	RADFORD AAP	1629	RFAAP Drinking Water- Pulaski County	250		Y	
AMC	AFSC	RADFORD AAP	1630	RFAAP Drinking Water-Montgomery County	1350		Y	
ARNG	OK	CAMP GRUBER TRAINING SITE	6522	CGTC Water Purification Plant	250		Y	
MEDCOM		FORT DETRICK	12000	Fort Detrick Water Treatment Plant	7000		Y	
NERO		ABERDEEN PROVING GROUND	6118	APG Edgewood Arsenal	5398		Y	
NERO		FORT MEADE	5024	Fort Meade Drinking Water System	50001		Y	
NERO		WEST POINT MIL RESERVATION	9695	Lusk and Stoney Lonesome WTP	11500		Y	
NWRO		FORT LEONARD WOOD	749	FLW WATER TREATMENT PLANT	28000		Y	
NWRO		ROCK ISLAND ARSENAL	7260	RIA - Public Water Supply	7500		Y	
SERO		FORT BRAGG	14463	Fort Bragg Water System	65000		Y	
SERO		FORT GORDON	499	Fort Gordon Water Treatment Plant	26500		Y	
SERO		REDSTONE ARSENAL	11980	Redstone Arsenal WTP #1, #2, #3	28500		Y	
USAR		FORT DIX	4513	Fort Dix Water Treatment and Distribution System	15266	Y	Y	4
AMC	CMA	DESERET CHEMICAL DEPOT	6365	DCD Drinking Water Wells 1 & 2	1500	Y		2
ARNG	AZ	CAMP NAVAJO	8484	Camp Navajo	650	Y		1
SERO		FORT JACKSON	705	Algiers Training Site	25	Y		1
SERO		FORT KNOX	9176	Knox Central WTP	19600	Y		
SERO		FORT KNOX	9177	Knox Muldraugh WTP	19600	Y		

Source: 3rd Qtr 2005 Army Environmental Database (AEDB-EQ)

with both a primary and backup laboratory. *Cryptosporidium* tests cost approximately \$500 per sample; therefore, the minimum required monitoring with two matrix spikes is approximately \$13,000. Depending on sample collection method, overnight shipping charges for 10 L of water (at least) would apply for each sample (roughly \$100 per 10 L sample). Additional resources:

- Figure, Compliance Timeline
- Appendix C, Compliance Flowcharts
- Appendix D, Laboratories Approved for Analysis of *Cryptosporidium* Under the SDWA
- Appendix E, LT2ESWTR – Method 1622/1623 FAQ
- EPA Source Water Monitoring Guidance Manual for Public Water Systems ([http://www.epa.gov/ogwdw/disinfection/lt2/pdfs/guide\\_lt2\\_swmonitoringguidance.pdf](http://www.epa.gov/ogwdw/disinfection/lt2/pdfs/guide_lt2_swmonitoringguidance.pdf))
- USACHPPM Laboratories, (410) 436-2208, <http://usachppm.apgea.army.mil/dls/>

(2) Consider sampling early and grandfathering the data. At the time this document was published, there were 39 EPA-approved laboratories capable of conducting *Cryptosporidium* testing. Fourteen of those laboratories (primarily city or State laboratories) are not accepting “outside” samples. There are approximately 1,700 PWSs that will be conducting *Cryptosporidium* monitoring. Although monitoring dates for these PWSs will be staggered based on system size, there will be some overlap. Additional resources:

- Appendix D, Laboratories Approved for Analysis of *Cryptosporidium* Under the SDWA
- Appendix C, Compliance Flowcharts
- USACHPPM Laboratories, (410) 436-2208, <http://usachppm.apgea.army.mil/dls/>

b. Preparing for the LT2ESWTR.

(1) Work closely with the State agency to ensure complete compliance. USACHPPM or the U.S. Army Environmental Center (USAEC) may be contacted for additional guidance. Army installations affected by Base Realignment and Closure (BRAC) in particular, need to coordinate with the State agency on how the LT2ESWTR will affect their PWS. A number of installations will be increasing, decreasing, or losing their population altogether. These PWSs will need to verify how to implement LT2ESWTR based on current or projected population numbers. Army PWSs must determine how the LT2ESWTR will apply. That is, a system must know the exact population, how many PWSs are on their installation, and whether or not sources



are surface water or GWUDI. These factors determine how the installation will proceed under the LT2ESWTR. Additional resources:

- Appendix G, EPA and State Agency Points of Contact
- [Stage2mdbp@epa.gov](mailto:Stage2mdbp@epa.gov) – email LT2ESWTR Implementation Team
- Appendix C, Compliance Flowcharts

(2) Seasonal recreational areas or ranges with a surface water/GWUDI source may be classified as a non-transient or transient non-community PWS. If such a system has a separate source from the main installation water treatment plant, monitoring will likely also be required for additional PWSs. Verify the information gathered by the installation matches that sent by the EPA or State agency. Contact the State agency for assistance for questions regarding determination of which PWSs must comply with the LT2ESWTR. Additional resources:

- Appendix G, EPA and State Agency Points of Contact
- [Stage2mdbp@epa.gov](mailto:Stage2mdbp@epa.gov) – email LT2ESWTR Implementation Team

(3) Technical assistance may be obtained from sources such as the USACHPPM, Water Supply Management Program at (410) 436-3919 or DSN 584-3919. Assistance may also be obtained from the USAEC, Environmental Compliance Division at (410) 436-7068 or DSN 584-7068.

## APPENDIX A

### REFERENCES

1. National Primary Drinking Water Regulations (NPDWR), Title 40, Code of Federal Regulations, rev., Part 141, July 2005.
2. Public Law 104-182, 6 August 1996, The Safe Drinking Water Act Amendments of 1996.
3. Drinking Water Priority Rulemaking: Microbial and Disinfection Byproducts Rules, U.S. Environmental Protection Agency (EPA), EPA-815-F-98-0014, Office of Ground Water and Drinking Water, 28 February 2006.
4. LeChevalier, M.W., et.al., Occurrence of *Giardia* and *Cryptosporidium* Species in Surface Water Supplies, *Applied and Environmental Microbiology*, Vol 57, 9:2610, 1991.
5. NPDWR: Interim Enhanced Surface Water Treatment; Final Rule, 63 *Federal Register* 69478, 16 December 1998.
6. NPDWR: Surface Water Treatment Rule; Final Rule, 54 *Federal Register* 27486, 29 June 1989.
7. NPDWR: Long Term 1 Enhanced Surface Water Treatment Rule; Final Rule, 67 *Federal Register* 1812, 14 January 2002.
8. NPDWR: Long Term 2 Enhanced Surface Water Treatment Rule; Final, *Federal Register* volume 71, number 3, 5 January 2006.
9. EPA, Office of Water, Contract No. 815-R06-005, Source Water Monitoring Guidance for Public Water Systems for the Final Long Term 2 Enhanced Surface Water Treatment Rule. February 2006.
10. EPA, Office of Water, Contract No. 816-F-06-019, LT2ESWTR Data Collection and Tracking System Factsheet. June 2006.
11. EPA, Office of Water, Contract No. 815-R-99-013, Disinfection Profiling and Benchmarking Guidance Manual. August 1999.
12. NPDWR: Stage 2 Disinfectants and Disinfection Byproducts Rule; Final Rule, 71 *Federal Register* 388, 4 January 2006.

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**APPENDIX B**  
**DEFINITIONS AND ABBREVIATIONS**

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**AMWA** – Association of Metropolitan Water Agencies

**AWWA** – American Water Works Association

**BRAC** – Base Realignment and Closure

**Bag filters** – pressure-driven separation devices that remove particulate matter larger than 1 micrometer using an engineered porous filtration media; typically constructed of non-rigid fabric filtration media housed in a pressure vessel

**Bank filtration** – water treatment process that uses a well to recover surface water that has naturally filtrated into ground water through a river bed/bank

**Bin** – treatment category filtered PWSs are placed specifying further treatment requirements

**CDS** – combined distribution system; interconnected distribution systems consisting of the wholesale system and consecutive PWSs receiving the water

**CFR** – Code of Federal Regulations

**CT** – the residual concentration of disinfectant (mg/l) multiplied by the contact time (in minutes)

**Cartridge filters** – pressure-driven separation devices that remove particulate matter larger than 1 micrometer using an engineered porous filtration media; typically constructed of rigid or semi-rigid, self-supporting filter elements housed in pressure vessels

**Community water system** – a public water system providing water to at least 15 service connections used by year-round residents or regularly serving at least 25 year-round residents

**DCTS** – Data Collection and Tracking System; component of the IPMC where PWSs can enter source water monitoring schedules

**DBPs** – disinfection byproducts

**DBPR** – Disinfectants/Disinfection Byproducts Rule

**Disinfection profile** – a graphical summary of the effectiveness of a PWSs disinfection practices

**Disinfection benchmark** – a PWSs lowest monthly average log inactivation using data collected for the disinfection profile

**Enhanced coagulation** – the addition of enough coagulant to improve removal of contaminants by conventional filtration

**EPA** – U.S. Environmental Protection Agency

**Flowing stream** – course of running water flowing in a definite channel

**GWUDI** – groundwater under the direct influence of surface water; any water beneath the surface of the ground with either (1) significant occurrence of insects, other macroorganisms, or large diameter pathogens; or (2) significant and relatively rapid shifts in water characteristics such as turbidity or temperature which closely correlate to climatological or surface water conditions

**HAA5s** – haloacetic acids (five)

**ICR** – Information Collection Rule

**IESWTR** – Interim Enhanced Surface Water Treatment Rule

**IPMC** – Information Processing and Management Center; centralized location for source water monitoring submissions

**Log** – logarithm (common, base 10)

**LT1** – Long Term 1 Enhanced Surface Water Treatment Rule

**LT2ESWTR** – Long Term 2 Enhanced Surface Water Treatment Rule

**MCL** – maximum contaminant level; the maximum permissible level of a contaminant in water which is delivered to any user of a public water system

**MCLG** – maximum contaminant level goal; non-enforceable health goals for public water systems set at levels that (in the EPA Administrator's judgement) allow no known or anticipated adverse effect on the health of persons to occur and that allow an adequate margin of safety

**M-DBP** – Microbial and Disinfectants/Disinfection Byproducts

**Membrane filtration** – pressure or vacuum driven separation process in which particulate matter larger than 1 micrometer is rejected by an engineered barrier, primarily through a size exclusion mechanism, and has a measurable removal efficiency of a target organism that can be verified through the application of a direct integrity test

**Microbial Toolbox** – the options available to PWSs that must implement additional treatment as per the LT2ESWTR requirements

**NPDWR** – National Primary Drinking Water Regulation

**NTU** – Nephelometric Turbidity Unit

**NTNCWS – Non-transient noncommunity water system**– public water system that is not a community water system and regularly serves at least 25 of the same persons over 6 months per year; common examples are those serving schools, day care centers, factories, and hospitals

**OEBGD** – Overseas Environmental Baseline Guidance Document

**PWS** – public water system; system for provision to the public of water for human consumption through pipes or other conveyance, if such system has at least 15 service connections or regularly serves an average minimum of 25 persons at least 60 days per year

**PWS ID** – unique identifying number given to each public water system

**Plant intake** – works or structures at the head of a conduit through which water is diverted from a source into the treatment plant

**Pre-sedimentation** – preliminary treatment process used to remove gravel, sand, and other particulates from the source water through settling before the water enters the primary clarification and filtration processes in a treatment plant

**Oocyst** – a spore phase in which the organism can survive for lengthy periods outside a host and also resist many common disinfectants

**Subpart H systems** – PWSs that use surface water or GWUDI as a source and that are subject to the requirements of 40 CFR 141, Subpart H (Surface Water Treatment Rule)

**SDWA** – Safe Drinking Water Act

**SWTR** – Surface Water Treatment Rule

**TCR** – Total Coliform Rule

**TTHMs** – Total Trihalomethanes; sum of the concentration in mg/l of the trihalomethane compounds chloroform, bromodichloromethane, dibromochloromethane, and bromoform, rounded to two significant figures



**TNCWS – Transient noncommunity water system** – public water system that is not a community water system and serves different people daily for at least 60 days out of the year; common examples are gas stations, hospitals, hotels

**Turbidity** – the measure of the scattering of light due to materials suspended in water

**Two-stage lime softening** – process in which chemical addition and hardness precipitation occur in each of two distinct unit clarification processes in series prior to filtration

**USACHPPM** – U.S. Army Center for Health Promotion and Preventive Medicine

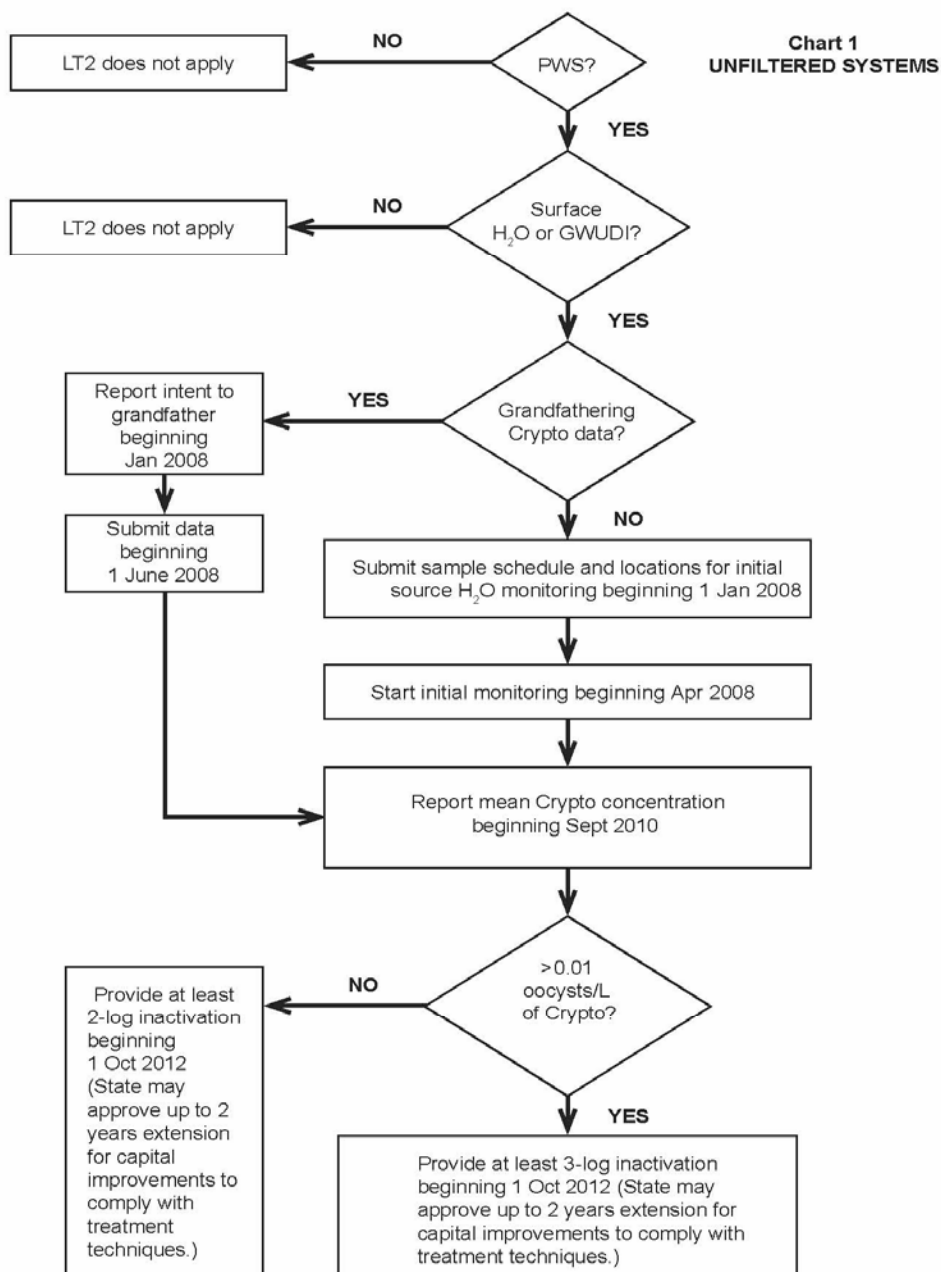
**USAEC** – U.S. Army Environmental Center

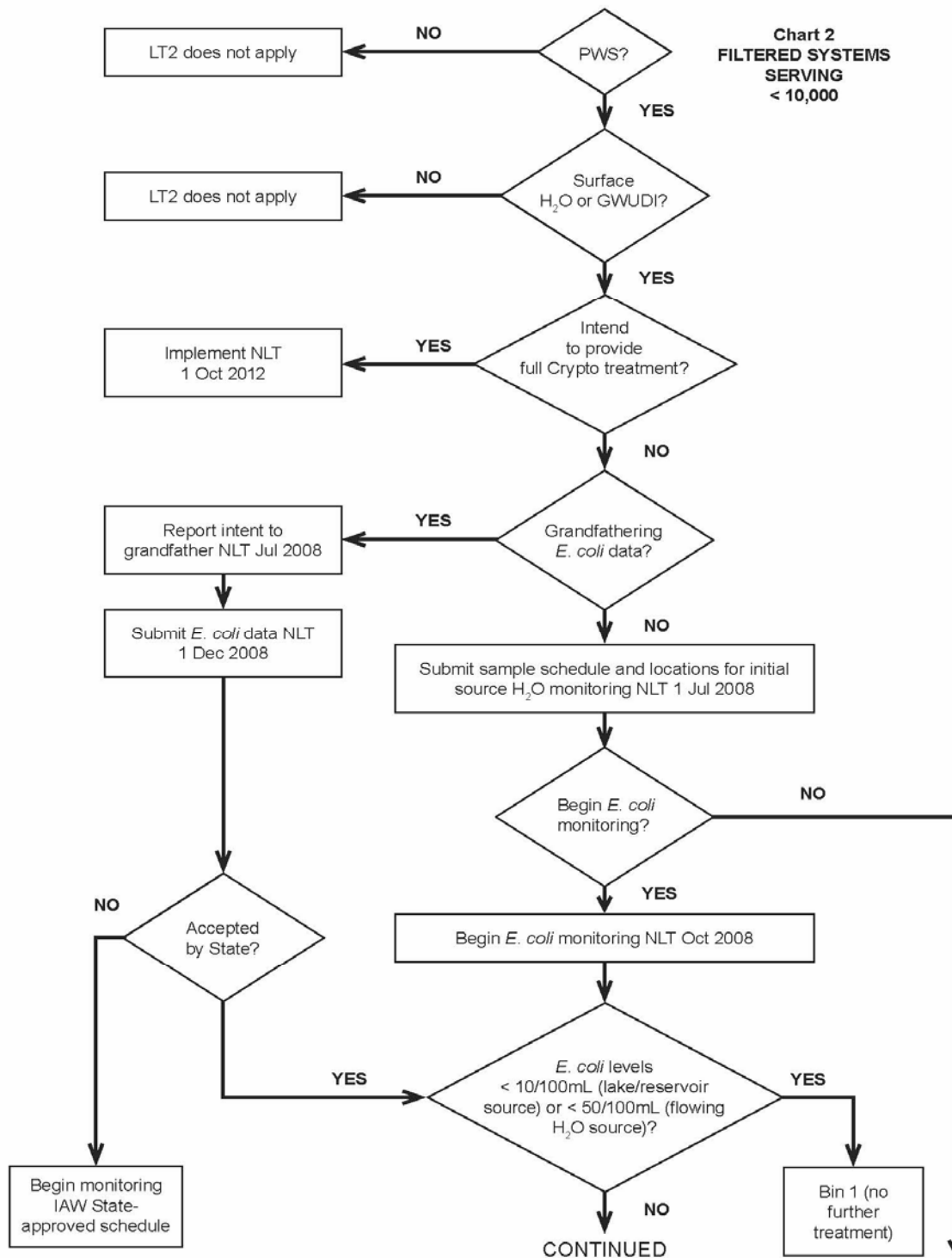
**UV** – ultraviolet light technology; a treatment technique used for disinfecting water as it passes by the UV lamps, however it has not had widespread acceptance as a potable water supply application because of the lack of measurable residual and the cost of operation

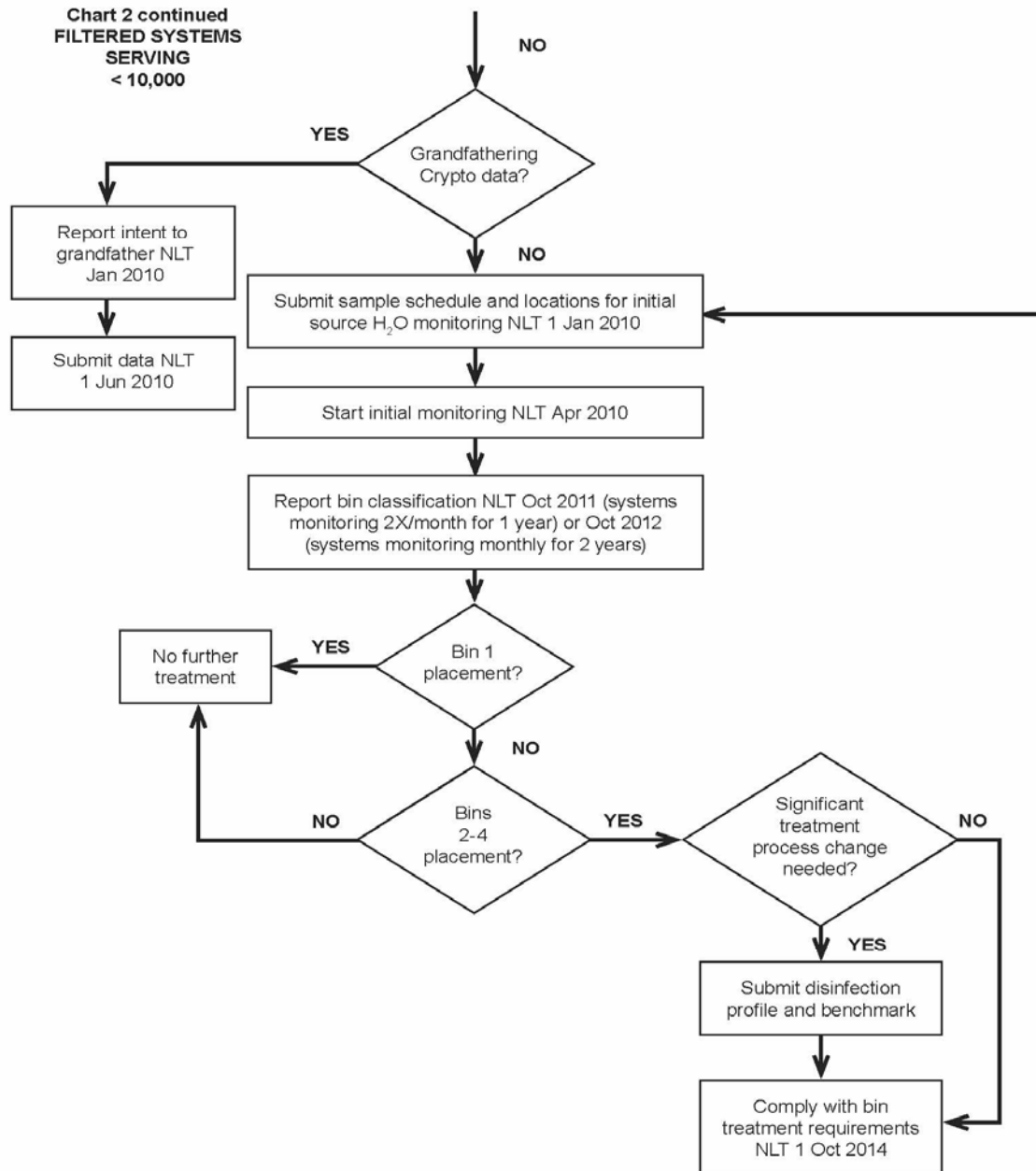
**WTP** – water treatment plant

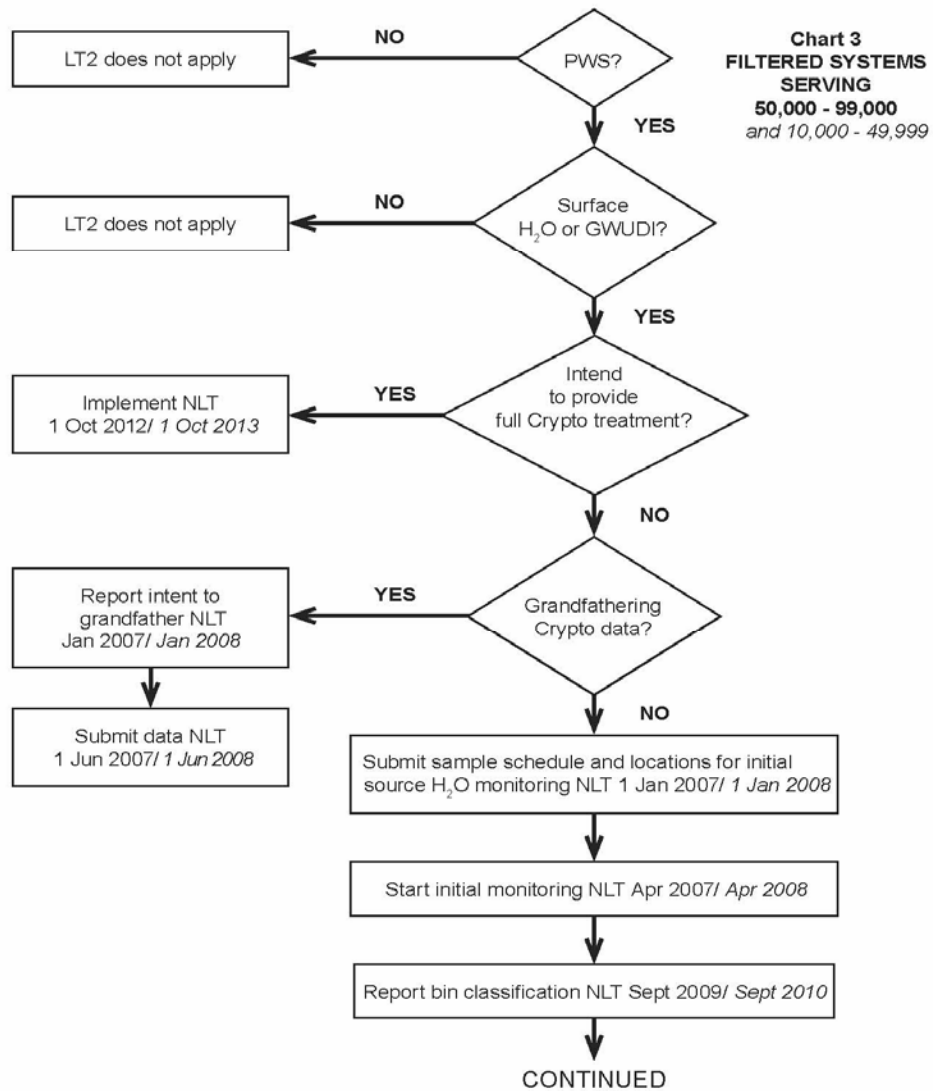
**APPENDIX C**  
**COMPLIANCE FLOWCHART**

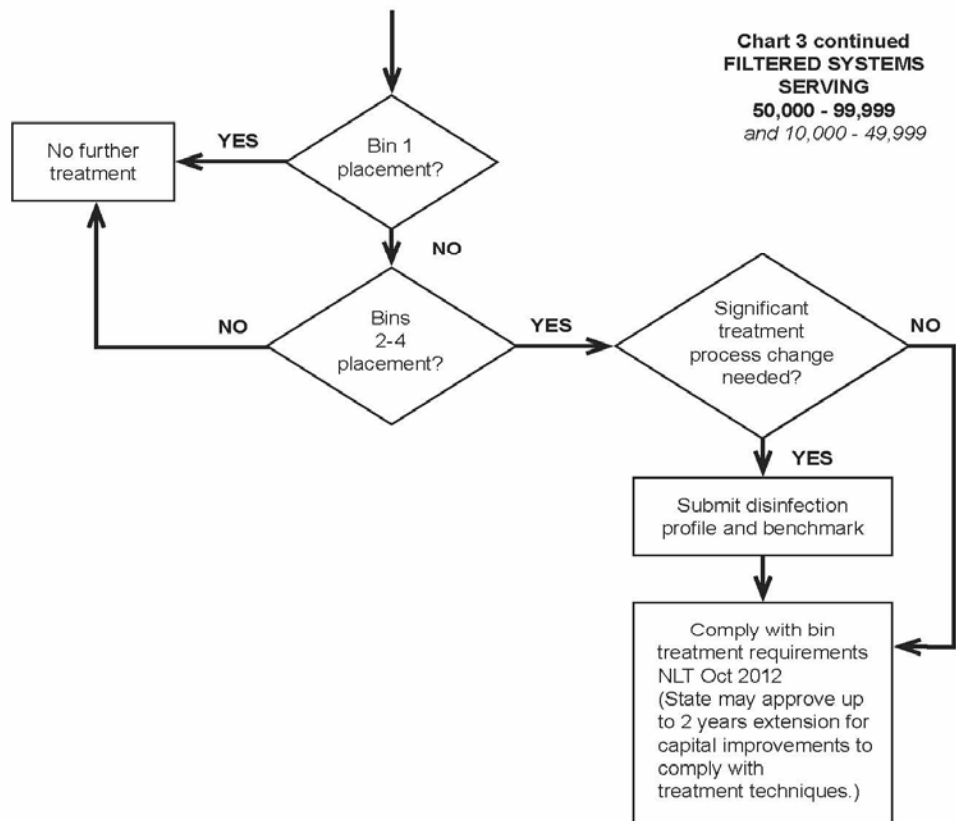
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**APPENDIX D**

**LABORATORIES APPROVED FOR THE ANALYSIS OF  
*CRYPTOSPORIDIUM* UNDER THE SDWA**

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# Water Supply Management Information Paper No. 31-042, July 2006

Laboratory Name	Lab Street Address	Lab City	Lab State	Lab Zip Code	Lab Contact Name	Lab Contact Phone Number	Lab Contact E-Mail Address	Accepting Outside Samples Under LT2?
Montgomery Water Works & Sanitary Sewer Board, Enviro Services Lab	6000 Richard E. Hanan Drive	Montgomery	AL	36108	Ms. Ginger Taylor	(334) 206-1600	gtaylor@mwwssb.com	Yes
TTL, Inc.	3516 Greensboro Ave.	Tuscaloosa	AL	35401	Tammy Watts	(205) 345-0816	tdwatts@ttlinc.com	Yes
City of Phoenix Water Services Lab	2474 S. 22nd Avenue	Phoenix	AZ	85009	Phil Johnson	(602) 534-2923	philip.johnson@phoenix.gov	No
City of Scottsdale Water Campus	8787 E. Hualapai Drive	Scottsdale	AZ	85255	Laura McCasland	(480) 312-8732	lmccasland@ci.scottsdale.az.us	No
BioVir Laboratories - Tampa	685 Stone Rd., Unit 6	Benicia	CA	94510	Dr. Richard Danielson	(707) 747-5906	red@biovir.com	Yes
City of San Diego Water Department	Water Operations Division, 5530 Kiowa Drive	La Mesa	CA	91942	Dan Silvaggio	(619) 668-3242	Dsilvaggio@sandiego.gov	Yes
Metropolitan Water District of So. CA	700 Moreno Avenue	La Verne	CA	91750	Dr. Ricardo DeLeon	(909) 392-5065	ricardo_deleon@mwdh20.com	No
San Francisco Public Utilities Commission	1000 El Camino Real	Millbrae	CA	94030	Jina Tin	(650) 872-5980	jtin@sfgwater.org	No
City of Los Angeles DWP	555 E. Walnut Street	Pasadena	CA	91101	Marlyn Stasiak	(213) 367-8487	Marlyn.stasiak@ladwp.com	No
Santa Clara Valley Water District	5750 Almaden Expressway	San Jose	CA	95118-3686	James Scott	(408) 265-2607	jscott@valleywater.org	No
Modesto Irrigation District	1008 Reservoir Rd.	Waterford	CA	95386	Claudia Hidahl	(209) 526-7608	claudiah@mid.org	Yes
CH Diagnostic & Consulting Services	214 SE 19th Street	Loveland	CO	80537	Dr. Greg Sturbaum	(970) 667-9789	gsturbaum@chdiagnostic.com	Yes
Orange County Utility Laboratory	9124 Curry Ford Road	Orlando	FL	32825	Dr. Terri Slifco	(407) 254-9551	terri.slifco@ocfl.net	Yes
Bureau of Laboratories - Tampa	3602 Spectrum Blvd.	Tampa	FL	33612	Dr. Deno Kazanis	(813) 974-8072	deno.kazanis@doh.state.fl.us	Yes
Tampa Water Dept. - QA Lab	7125 N. 30th St.	Tampa	FL	33610	John Gordy	(813) 231-5234	john.gordy@ci.tampa.fl.us	Yes
Georgia DNR, Environmental Protection Division	455 14th Street, NW	Atlanta	GA	30318	Viola Reynolds	(404) 206-5210	myrna_finch@mail.dnr.state.ga.us	No
University Hygienic Laboratory	102 Oakdale Campus	Iowa City	IA	52242	Nancy Hall	(319) 335-4331	nhall@uhl.uiowa.edu	Yes

# Water Supply Management Information Paper No. 31-042, July 2006

Laboratory Name	Lab Street Address	Lab City	Lab State	Lab Zip Code	Lab Contact Name	Lab Contact Phone Number	Lab Contact E-Mail Address	Accepting Outside Samples Under LT2?
American Water	1115 South Illinois Street	Belleville	IL	62220	Janice R. Weihe	(618) 239-0506	jweihe@amwater.com	Yes
Scientific Methods Inc.	12441 Beckley Street	Granger	IN	46530	Fr-chih Hsu	(574) 277-4078	fuchih@scientificmethods.com	Yes
Veolia	950 W. 16th Street	Indianapolis	IN	46202	Daniel Rabb	(317) 920-3381	dan.rabb@iwcr.com	Yes
Underwriters Laboratories Inc.	110 S. Hill Street	South Bend	IN	46617	Ellen Myers	(800) 332-4345 ext. 45530	Ellen.Myers@us.ul.com	Yes
Louisville Water Company	550 South 3rd Street	Louisville	KY	40202-1839	Roger Tucker	(502) 569-3600	rtucker@lwcky.com	No
City of St. Louis Water Division	Howard Bend Laboratory, 700 Water Works Rd	Chesterfield	MO	63017	Jim Kopp	(314) 469-1901	jkopp@stlwater.com	No
Southern Nevada Water System	243 Lakeshore Road	Boulder City	NV	89005	Charles Meyer	(702) 567-2044	chuck.meyer@lvvwd.com	No
Environmental Associates Ltd.	24 Oak Brook Drive	Ithaca	NY	14850	Dr. Susan Boutros	(607) 272-8902	susanboutros@eal-labs.com	Yes
Erie County Water Authority	1951 Hamburg Turnpike	Lackawanna	NY	14218	Raymond Dittmer	(716) 826-6230	rdittmer@ecwa.org	Yes
NYC DEP Pathogen Laboratory	Ben Nesin Lab, Route 28A	Shokan	NY	12481	Lisa Blancero	(845) 657-2361	lblancero@dep.nyc.gov	No
Mohawk Valley Water Authority	1 Kennedy Plaza, Box 345	Utica	NY	13503	Connie Schreppel	(315) 792-0317	cschreppel@mvwa.us	Yes
Friend Laboratory Inc	32 Ithaca Street	Waverly	NY	14892	Hal Warso	(607) 565-3500	hwarso@microbac.com	Yes
Shaw Environmental and Infrastructure, Inc.	26 W. Martin Luther King Blvd. USEPA ML140	Cincinnati	OH	45219	Nancy Shaw	(513) 569-7996	shaw.nancy@epa.gov	No
Grants Pass Water Laboratory, Inc.	558 N.E. "F" Street, Suite 1	Grants Pass	OR	97526	Jill Cunningham	(541) 476-0733	DoreeSchaafsma@gpwaterlab.com	Yes
City of Philadelphia	1500 East Hunting Park Ave.	Philadelphia	PA	19124-4941	Kenneth Sarkis	(215) 685-1427	kenneth.sarkis@phila.gov	No
Utah Dept. of Health, Div. of Laboratory Services	46 N. Medical Drive	Salt Lake City	UT	84113	Dr. Sanwat Chauduri	(801) 584-8448	schaudhu@utah.gov	Yes*

Water Supply Management Information Paper No. 31-042, July 2006

Laboratory Name	Lab Street Address	Lab City	Lab State	Lab Zip Code	Lab Contact Name	Lab Contact Phone Number	Lab Contact E-Mail Address	Accepting Outside Samples Under LT2?
Clancy Environmental Consultants, Inc.	2 Mapleville Depot	St. Albans	VT	5478	Randi McCuin	(802) 527-2460	rmccuin@clancyenv.com	Yes
Analytical Services, Inc.	P.O. Box 515	Williston	VT	5495	Tom Smith	(800) 723-4432 Ext. 17	tsmith@analyticalservices.com	Yes
U.S.EPA, R10 Manchester Laboratory	7411 Beach Drive, E.	Port Orchard	WA	98366	Dr. Stephanie Harris	(360) 871-8710	harris.stephanie@epa.gov	No
Lab/Cor, Inc.	7619 6th Ave. NW	Seattle	WA	98117	Derk Wipprecht	(888) 522-2674	dwipprecht@labcor.net	Yes
Wisconsin State Laboratory of Hygiene	2601 Agriculture Dr., Room 202	Madison	WI	53718	Sharon Kluender	(608) 224-6262	hesk@mail.slh.wisc.edu	Yes
Milwaukee Health Dept. - Microbiology Laboratory	841 N. Broadway, Rm 205	Milwaukee	WI	53202	Dr. Ajaib Singh	(414) 286-3526	asingh@milwaukee.gov	Yes

\* Will accept limited samples from geographically close regions.

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**APPENDIX E**

**LT2ESWTR – METHOD 1622/1623 FAQ**

**(Adapted from BioVir Laboratories)**



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## LT2ESWTR - METHOD 1622/23 FAQs

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### Introduction

The *Long Term 2 Enhanced Surface Water Treatment Rule* (LT2ESWTR or LT2) rule was promulgated in the Federal Register on January 5<sup>th</sup>, 2006 after many years in development. The effective date of the rule is March 6, 2006 and staggered-start (based on population served) testing for *Cryptosporidium* will begin in September 2006.

BioVir has received many questions regarding the requirements for *Cryptosporidium* sampling and analysis associated with LT2 mandated testing. We hope that you find the information below informative.

1. **What are some of the potential costs associated with 1622/1623 analysis?**
  - a. Basic Analysis including filter (client supplies 10 Liter grab sample and BioVir filters in the lab. BioVir can also provide one filter for field filtration); or
  - b. Basic Analysis without filter (utility supplies their own filter and filters in-the-field).
  - c. Additional filters required as a result of matrix (i.e., Turbid sample which clogs filter element prior to filtering 10 liter volume. 2 Filters max required).
  - d. Additional slides (sub-samples) for examination required as a result of matrix (i.e., Packed pellet volume in excess of ½ mL. 1 slide per ½ mL of packed pellet. Examination of 2 mL of packed pellet or 10 Liters required.)
  - e. Matrix spike samples at every site and every 20 samples thereafter.
  - f. All freight costs.
2. **Which is the better Method, 1622 or 1623?**
  - a. Neither. The methods are virtually identical except that Method 1622 detects only *Cryptosporidium* while Method 1623 detects *Cryptosporidium* and *Giardia*.
  - b. Reportable protozoan data to the EPA for LT2 is for *Cryptosporidium* only. Data generated regarding *Giardia* if Method 1623 is chosen, will be reported only to the Utility and will be for Utility use only.
3. **What volume of sample do I take?**
  - a. At least 10 Liters.
  - b. More volume can be taken but the EPA encourages that a similar volume be taken consistently throughout the study.

**LT2ESWTR - METHOD 1622/23 FAQs**

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- c. Gelman HV capsule filters are approved for up to a 50 Liter sample volume.
  - d. Link to EPA LT2 web site and Proposed LT2 Rule can be found on under "LT2 Information" on our web-site home page at [www.biovir.com](http://www.biovir.com).
- 4. If the detection limit for a 10 liter sample is <0.1/Liter, how can I achieve a <0.075/Liter concentration for my utility to land in Bin 1?**
- a. According to the Rule the calculation for determining bin classification is to be based on averaging the oocyst concentrations measured for individual samples.
  - b. The individual sample concentrations are to be determined by dividing the total oocyst count by the total volume assayed.
  - c. It is important to note the amount *assayed* may not be equal to the amount *sampled*. The amount assayed will be affected by the individual sample quality and by your choices in limiting the examination of additional slides.
  - d. The method that systems will use to average individual sample concentrations depends on the number of samples collected and the length of the sampling period. For Large Systems (>10,000) collecting 24 to 47 samples they will calculate the highest twelve month running annual average during the 24 month collection period. For Large Systems collecting at least twice monthly samples during the 24 month collection period the arithmetic mean of all samples will be calculated.
- 5. How can I affect the average number per liter?**
- a. Take more samples (consistently throughout the program).
  - b. Take larger volume samples (consistently throughout the program).
- 6. How should I collect the sample?**
- a. By Grab sample (for example a 10 L cubitainer); or
  - b. In-the-field filtration.
- 7. What are some of the advantages to filtering in the field?**
- a. If you supply your own filter, you save effort by obtaining all your filters at one time;
  - b. Filtering at your Utility makes taking a larger sample more practical.
  - c. The larger volume increases the denominator for calculating which "Bin" you will belong.
  - d. The cost of shipping 10 L of water + ice is pretty expensive (the water alone will be over 20 lbs).
  - e. The filter element is easier to chill and keep cold.
- i. Samples need to be chilled (<20° C) as quickly as possible. Target 10° C.
  - ii. Samples must be chilled (<20° C) prior to shipment. Target 10° C.
  - iii. Samples must arrive at BioVir unfrozen and at <20° C or they must be rejected according to the rule.

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**8. What are some of the disadvantages to filtering in the field?**

- a. Sampling is more cumbersome.
- b. Sampling requires a filtration apparatus.
- c. Creates a greater possibility of freezing the samples (filter cartridge /v/ bulk water) during shipment (would invalidate sample).
- d. MATRIX SPIKE: EPA stipulates that the matrix spikes (with Crypto) have to be done using the planned sampling volume (e.g., 10L or 50L), must be within 10% of the regular sample volume and should be collected using a split-stream technique. The split-stream technique allows for collection of the regular and matrix spike samples simultaneously.
- e. MATRIX SPIKE: Matrix spike samples will always have at least a 10 Liter grab sample associated with them. If 10 Liters equals the regular sample volume, then the grab is simply sent to the lab with the regular sample. If the regular sample is of greater volume (e.g. 50 Liters) then the Utility may filter 40L liters in the field and ship the capsule filter and the remaining 10 Liters as a grab sample to BioVir; BioVir will add the spike to the additional 10 L here at the lab and process the final 10L plus spike through the same filter. **Note:** a matrix spike will always entail two samples, one is the regular sample and the other is the one to be spiked. You need to obtain and maintain a sampling apparatus.

**9. Does BioVir supply the carboys? If you do, is there an additional cost?**

- a. BioVir supplies one 2.5 gal (10L) cubitainer at no additional cost (except for shipping).

**10. When do I submit a matrix spike sample?**

- a. EPA recommends submission of a Matrix Spike sample with the initial sample. 5% of samples must have an associated matrix spike.

**11. Does the matrix spike cover all of my sources, or do I have to conduct a matrix spike for each one?**

- a. The matrix spike is site specific, each site will require at least 2 matrix spike samples during the course of the LT2.

**12. Does BioVir provide filters for filtering in the field?**

- a. We will provide filters if requested. We can provide a quotation based on Analysis with or without cartridge filters.
- b. A utility may buy their own filters (BioVir plans to use Gelman HV filters almost exclusively).
- c. In addition, if we supply the filters, then we will be sending them to you prior to your pre-scheduled sample date(s).

**LT2ESWTR - METHOD 1622/23 FAQs**

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- 13. If I filter in-the-field, where do I get a sampling apparatus?**
- BioVir will have a limited number of field sampling kits (all the hoses, flow restrictor, pressure regulator, etc.) that, if you use BioVir exclusively for LT2 testing, will be yours to keep and maintain for the duration of LT2.
  - If you assemble your own apparatus, BioVir can supply you with a basic schematic and parts list.
- 14. Will you provide the 10L vessel for the Matrix Spike Sample?**
- We can if requested.
  - We will send you a 10L cubitainer.
- 15. Do you send us the ice packs, any container we may need and/or a container to send filter or cubitainer back?**
- You will need to provide wet ice in order to chill samples prior to packaging and shipment. BioVir has performed a number of experiments regarding this issue. Call us for additional details.
  - We can provide a 48 qt. cooler for use in shipping your bulk samples (you would be responsible for the shipping charges).
  - In the case of shipping a pre-chilled filter, we provide reusable ice bricks and a insulated shipping container.
  - In any case, if we supply the containers, you only pay for the shipping, not the containers themselves.
- 16. What kind of advance notice do you need for setting us up with accounts payable information, filtering apparatus, and all the information for "set-up" we will need?**
- We can set the administrative details up after receiving a purchase order (e-mail, FAX or phone).
  - Payment arrangements are made through our office manager, Nancy Rice ([nlr@biovir.com](mailto:nlr@biovir.com), same phone/fax numbers listed above).
  - Scheduling is completed by contacting any of our customer service personnel.
  - The filtering apparatus can be sent to you soon after you call.
  - Right now sample shipment is on a "first come" basis. We expect that as the mandated start date nears and many Utilities are gearing up to begin sampling, that sampling dates will be determined by "space available".
- 17. I want to use this data as "Grandfathered Data". Can I?**
- If you intend to submit the *Cryptosporidium* results to the EPA as "Grandfathered Data" you must first let us know of your intent. The requirements of Method 1623 for LT2 differ from the method as published.

**LT2ESWTR - METHOD 1622/23 FAQs**

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- b. You must adhere to the requirements of the LT2ESWTR Rule. Some of the requirements for data submitted as “grandfathered” are:
  - i. The data must be generated using the validated versions of EPA Method 1622/1623.
  - ii. Be fully compliant with the QA/QC criteria specified in the version of Method 1622/23 used to generate the data.
  - iii. Be representative of a plant’s source water(s) and the source water(s) must not change.
  - iv. Samples must be collected at least each calendar month and on a regular basis. Currently 2 days before or after a set date each month. Please see final rule Section IV,1,g. Grandfathered Data Quality Requirements.
  - v. Data should be collected in equal intervals of time over the entire collection period (e.g. Daily, weekly or monthly). Deviations in the sampling frequency of previously collected data are allowed under certain conditions. Please see final rule Section IV,1,g. Grandfathered Data Quality Requirements.
  - vi. Data collected prior to January 1999 is not valid.
  - vii. All source water *Cryptosporidium* data collected during the period must be submitted.
  - viii. Sample volumes of at least 10L must be analyzed or, in cases where 10L are not analyzed, at least 2 mL of packed pellet volume or the volume filtered by 2 capsule filters must be analyzed.
  - ix. Matrix spike samples must be analyzed at a frequency of at least 5% (1 per 20 monitoring samples).
  - x. Sample temperature at receipt must be unfrozen and <20°C or sample will be rejected.
- c. Schedule for Submission of Grandfathered Data
  - i. Utilities submit their intent to grandfather data within 3 months prior to their mandated monitoring start date.
  - ii. Utilities must report previously collected monitoring results for grandfathering, along with required documentation listed in Section IV.1.g of the Final Rule no later than 2 months after their required monitoring start date.

**18. I have other questions. How can I get them answered?**

- a. Call 1-800-GIARDIA (442-7342), we’ll be happy to help you.
- b. E-mail us at [csj@biovir.com](mailto:csj@biovir.com), [ejb@biovir.com](mailto:ejb@biovir.com), or [red@biovir.com](mailto:red@biovir.com)
- c. Go to [www.biovir.com](http://www.biovir.com) and click on the LT2 Information button where you will find more information and links to the EPA LT2 web-site.

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## **APPENDIX F**

### **EPA GUIDANCE MANUALS AND FACTSHEETS**



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### **Source Water Monitoring Guidance**

**Status:** Final guidance released in February 2006.

**Description:** The Source Water Monitoring Guidance provides surface and GWUDI water systems, laboratories, States, Tribes, and other primacy agencies with a review of the source water monitoring provisions. Surface water systems are required to conduct source water monitoring for *Cryptosporidium*, *E. coli*, and turbidity to assess the relative risk of the source water and determine additional treatment needs, if any. The source water monitoring guidance manual provides direction to the systems on how, where, and when to monitor and how to report the data; and summarizes how the data can be evaluated and used to determine risk bin classification. It also includes the information currently available in Guidance on Grandfathering *Cryptosporidium* Data ([www.epa.gov/ogwdw/disinfection/lt2/compliance\\_grand.html](http://www.epa.gov/ogwdw/disinfection/lt2/compliance_grand.html))

**Target Audience:** Surface water and GWUDI systems, laboratories, States, Tribes, other primacy agencies

### **Microbial Laboratory Guidance**

**Status:** Final Guidance released in February 2006.

**Description:** The Microbial Laboratory Guidance manual provides information regarding analytical methods required for analysis of *Cryptosporidium* and *E. coli* samples under the LT2ESWTR, and other LT2ESWTR requirements for sample collection and analysis, analytical methods, recordkeeping and data reporting. It also provides information regarding laboratory quality control, the EPA Laboratory Quality Assurance Evaluation Program, and vendor suppliers.

**Target Audience:** *Cryptosporidium* and *E. coli* laboratories

### **Small Entity Compliance Guidance**

**Status:** Final guidance will be available in mid-2006.

**Description:** This guidance document is intended for small public water systems (serving < 10,000 people), as required by the Small Business Regulatory Enforcement Fairness Act of 1996. This guide contains a general introduction and background for the LT2ESWTR, describes the specific requirements of the LT2ESWTR, and provides information on how to comply with those requirements.

**Target Audience:** Small surface water and GWUDI systems.

### **Microbial Toolbox Guidance Manual**

**Status:** Revised draft guidance will be released for comment in mid-2006.

**Description:** Surface water and GWUDI systems required to provide treatment under the LT2ESWTR can select from numerous “microbial toolbox” treatment options to meet treatment requirements. This draft manual provides general information on the LT2ESWTR regulation and treatment requirements. It also provides guidance on the selection, design, and operation of treatment and management strategies for each of the 15 treatment options in the LT2ESWTR “microbial toolbox” that can be used to comply with treatment requirements under the rule.

**Target Audience:** Surface water and GWUDI systems required to install treatment under the LT2ESWTR.

### **Ultraviolet Disinfection Guidance Manual**

**Status:** Final guidance will be available in early 2006.

**Description:** Surface water and GWUDI systems required to provide treatment under the LT2ESWTR can utilize ultraviolet (UV) disinfection as one of the “microbial toolbox” treatment options to meet treatment requirements. This draft manual provides background information on fundamentals of UV light, microbial response to UV light, and UV reactors. It also provides guidance on the selection, design, installation, testing, startup, operation, maintenance, monitoring, recording and reporting of UV disinfection to comply with treatment requirements under the rule.

**Target Audience:** Surface water and GWUDI systems required to install treatment under the LT2ESWTR.

### **Ultraviolet Disinfection Guidance Manual Workbook**

**Status:** Revised workbook will be available in early 2006.

**Description:** This Excel workbook is a supplement to the draft Ultraviolet (UV) Disinfection Guidance Manual. It includes worksheets for calculating the RED bias, polychromatic bias, and safety factor described in the UV Manual. Use of this workbook is not required for applying the UV Manual, but it may serve as a useful tool for calculating site-specific factors.

**Target Audience:** Surface water and GWUDI systems required to install treatment under the LT2ESWTR.

### **Membrane Filtration Guidance Manual**

**Status:** Final guidance made available in March 2006.

**Description:** Surface water and GWUDI systems required to provide treatment under the LT2ESWTR can utilize membrane filtration as one of the “microbial toolbox” treatment options to meet treatment requirements. This manual is designed to provide surface water systems with an overview of membrane filtration and information regarding: requirements for membrane filtration under the LT2ESWTR; membrane filtration system design and operation; membrane filtration testing requirements; and startup and implementation considerations ([www.epa.gov/ogwdw/disinfection/lt2/pdfs/guide\\_lt2\\_membranefiltration\\_final.pdf](http://www.epa.gov/ogwdw/disinfection/lt2/pdfs/guide_lt2_membranefiltration_final.pdf)).

**Target Audience:** Surface water and GWUDI systems required to install treatment under the LT2ESWTR.

### **Simultaneous Compliance Guidance Manual for Stage 2 Rules**

**Status:** Draft guidance scheduled to be released for comment in early 2006.

**Description:** This manual discusses the issues systems will face as they evaluate and implement changes necessary to comply with the Stage 2 DBPR and the LT2ESWTR, while still being required to comply with earlier rules such as the Total Coliform Rule and Lead and Copper Rule. Some of the changes that systems may make can have unanticipated or unwelcome consequences

if not properly designed, implemented, and monitored. This manual builds on a similar manual developed for the Stage 1 rules, incorporating new research and case studies and presented in a more user-friendly manner. EPA is developing this guidance manual to provide systems and States information on operational and capital changes and approaches to enable systems to evaluate different compliance strategies and technologies.

**Target Audience:** Public water systems making treatment and operational changes to comply, States.

### **Low-pressure Membrane Filtration for Pathogen Removal: Application, Implementation, and Regulatory Issues**

**Status:** Published 2001 ([www.epa.gov/ogwdw/disinfection/lt2/compliance\\_membrane-filt.html](http://www.epa.gov/ogwdw/disinfection/lt2/compliance_membrane-filt.html)).

**Description:** This report summarizes the state of membrane filtration in 2000 as applied for pathogen removal. The results of the study summarized in this report were used to support the development of the regulatory framework and guidance for membrane filtration under the LT2ESWTR.

**Target Audience:** Public water systems and states.

### **Quick Reference Guide to LT2ESWTR**

**Status:** Expected to be released early 2006.

This document should provide a simple and straightforward description of the rule, critical deadlines and requirements for drinking water systems and states, and information on monitoring requirements.

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## Fact Sheet - Long Term 2 Enhanced Surface Water Treatment Rule

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In the past 30 years, the Safe Drinking Water Act (SDWA) has been highly effective in protecting public health and has also evolved to respond to new and emerging threats to safe drinking water. Disinfection of drinking water is one of the major public health advances in the 20th century. One hundred years ago, typhoid and cholera epidemics were common through American cities; disinfection was a major factor in reducing these epidemics.

In the past 15 years, we have learned that there are specific microbial pathogens, such as *Cryptosporidium*, which can cause illness, and are highly resistant to traditional disinfection practices. We also know that the disinfectants themselves can react with naturally-occurring materials in the water to form byproducts, which may pose health risks.

Amendments to the SDWA in 1996 require EPA to develop rules to balance the risks between microbial pathogens and disinfection byproducts (DBPs). The Stage 1 Disinfectants and Disinfection Byproducts Rule and Interim Enhanced Surface Water Treatment Rule, promulgated in December 1998, were the first phase in a rulemaking strategy required by Congress as part of the 1996 Amendments to the Safe Drinking Water Act.

The Long Term 2 Enhanced Surface Water Treatment Rule builds upon earlier rules to address higher risk public water systems for protection measures beyond those required for existing regulations.

The Long Term 2 Enhanced Surface Water Treatment Rule and the Stage 2 Disinfection Byproduct Rule are the second phase of rules required by Congress. These rules strengthen protection against microbial contaminants, especially *Cryptosporidium*, and at the same time, reduce potential health risks of DBPs.

### Questions and Answers

#### ***What is the LT2ESWTR?***

The purpose of Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) is to reduce illness linked with the contaminant *Cryptosporidium* and other pathogenic microorganisms in drinking water. The LT2ESWTR will supplement existing regulations by targeting additional *Cryptosporidium* treatment requirements to higher risk systems. This rule also contains provisions to reduce risks from uncovered finished water reservoirs and provisions to ensure that

systems maintain microbial protection when they take steps to decrease the formation of disinfection byproducts that result from chemical water treatment.

Current regulations require filtered water systems to reduce source water *Cryptosporidium* levels by 2-log (99 percent). Recent data on *Cryptosporidium* infectivity and occurrence indicate that this treatment requirement is sufficient for most systems, but additional treatment is necessary for certain higher risk systems. These higher risk systems include filtered water systems with high levels of *Cryptosporidium* in their water sources and all unfiltered water systems, which do not treat for *Cryptosporidium*.

The LT2ESWTR is being promulgated simultaneously with the Stage 2 Disinfection Byproduct Rule to address concerns about risk tradeoffs between pathogens and DBPs.

***What are the health risks of Cryptosporidium?***

*Cryptosporidium* is a significant concern in drinking water because it contaminates most surface waters used as drinking water sources, it is resistant to chlorine and other disinfectants, and it has caused waterborne disease outbreaks. Consuming water with *Cryptosporidium* can cause gastrointestinal illness, which may be severe and sometimes fatal for people with weakened immune systems (which may include infants, the elderly, and people who have AIDS).

***Who must comply with this rule?***

This regulation will apply to all public water systems that use surface water or ground water under the direct influence of surface water.

***What does the rule require?***

**Monitoring:** Under the LT2ESWTR, systems will monitor their water sources to determine treatment requirements. This monitoring includes an initial two years of monthly sampling for *Cryptosporidium*. To reduce monitoring costs, small filtered water systems will first monitor for *E. coli* – a bacterium which is less expensive to analyze than *Cryptosporidium*—and will monitor for *Cryptosporidium* only if their *E. coli* results exceed specified concentration levels.

Monitoring starting dates are staggered by system size, with smaller systems beginning monitoring after larger systems. Systems must conduct a second round of monitoring six years after completing the initial round to determine if source water conditions have changed significantly. Systems may use (grandfather) previously collected data in lieu of conducting new monitoring, and systems are not required to monitor if they provide the maximum level of treatment required under the rule.

**Cryptosporidium treatment:** Filtered water systems will be classified in one of four treatment categories (bins) based on their monitoring results. The majority of systems will be classified in

the lowest treatment bin, which carries no additional treatment requirements. Systems classified in higher treatment bins must provide 90 to 99.7 percent (1.0 to 2.5-log) additional treatment for *Cryptosporidium*. Systems will select from a wide range of treatment and management strategies in the “microbial toolbox” to meet their additional treatment requirements. All unfiltered water systems must provide at least 99 or 99.9 percent (2 or 3-log) inactivation of *Cryptosporidium*, depending on the results of their monitoring. These *Cryptosporidium* treatment requirements reflect consensus recommendations of the Stage 2 Microbial and Disinfection Byproducts Federal Advisory Committee.

**Other requirements:** Systems that store treated water in open reservoirs must either cover the reservoir or treat the reservoir discharge to inactivate 4-log virus, 3-log *Giardia lamblia*, and 2-log *Cryptosporidium*. These requirements are necessary to protect against the contamination of water that occurs in open reservoirs. In addition, systems must review their current level of microbial treatment before making a significant change in their disinfection practice. This review will assist systems in maintaining protection against microbial pathogens as they take steps to reduce the formation of disinfection byproducts under the Stage 2 Disinfection Byproducts Rule, which EPA is finalizing along with the LT2ESWTR.

#### ***What are the benefits of the rule?***

The LT2ESWTR will improve the control of *Cryptosporidium* and other microbiological pathogens in drinking water systems with the highest risk levels. EPA estimates that full compliance with the LT2ESWTR will reduce the incidence of cryptosporidiosis - the gastrointestinal illness caused by ingestion of *Cryptosporidium* - by 89,000 to 1,459,000 cases per year, with an associated reduction of 20 to 314 premature deaths. The monetized benefits associated with these reductions ranges from \$253 million to \$1.445 billion per year. The additional *Cryptosporidium* treatment requirements of the LT2ESWTR will also reduce exposure to other microbial pathogens, such as *Giardia*, that co-occur with *Cryptosporidium*. Additional protection from microbial pathogens will come from provisions in this rule for reviewing disinfection practices and for covering or treating uncovered finished water reservoirs, though EPA has not quantified these benefits.

#### ***What are the costs of the rule?***

The LT2ESWTR will result in increased costs to public water systems and states. The average annualized present value costs of the LT2ESWTR are estimated to range from \$92 to \$133 million (using a three percent discount rate). Public water systems will bear approximately 99 percent of this total cost, with states incurring the remaining 1 percent. The average annual household cost is estimated to be \$1.67 to \$2.59 per year, with 96 to 98 percent of households experiencing annual costs of less than \$12 per year.



***What technical information will be available on the rule?***

The following guidance documents will be available:

- Source Water Monitoring Guidance
- Microbial Laboratory Guidance
- Small Entity Compliance Guidance
- Microbial Toolbox Guidance Manual
- Ultraviolet Disinfection Guidance Manual
- Membrane Filtration Guidance Manual
- Simultaneous Compliance Guidance Manual
- Low-pressure Membrane Filtration for Pathogen Removal: Application, Implementation, and Regulatory Issues

***Where can I find more information about this notice and the LT2ESWTR?***

For general information on the LT2ESWTR, contact the Safe Drinking Water Hotline at (800) 426-4791. The Safe Drinking Water Hotline is open Monday through Friday, excluding legal holidays, from 10:00 a.m. to 4:00 p.m., Eastern time. For copies of the Federal Register notice of the regulation or technical fact sheets, visit the EPA Safewater website at <http://www.epa.gov/safewater/disinfection/lt2> . For technical inquiries, email [stage2mdbp@epa.gov](mailto:stage2mdbp@epa.gov) .

## **APPENDIX G**

### **EPA AND STATE POINTS OF CONTACT**

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## LT2 Contact List

Region	State	LT2 Contact	Telephone Number	Email Address
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